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ABSTRACT

The Teacher Enhancement (TE) program of the National Science Foundation aims to enhance the disciplinary, pedagogical, and leadership skills of science, mathematics, and technology teachers, and to actively involve administrators and others who play significant roles in ensuring a quality education to all students. This publication describes all projects of the Teacher Enhancement program that were active awards as of 1995. Currently TE supports five major categories of projects: (1) local systemic change; (2) teaching enhancement; (3) replication and infrastructure; (4) professional development materials; and (5) professional support for the teaching workforce. The projects are grouped by state. (JRH)

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ED 406 230

SUMMARY OF AWARDS

TEACHER ENHANCEMENT
ACTIVE AWARDS FISCAL YEAR 1994

SE 059 999

Division of Elementary, Secondary, and
Informal Education
Directorate for Education and Human Resources

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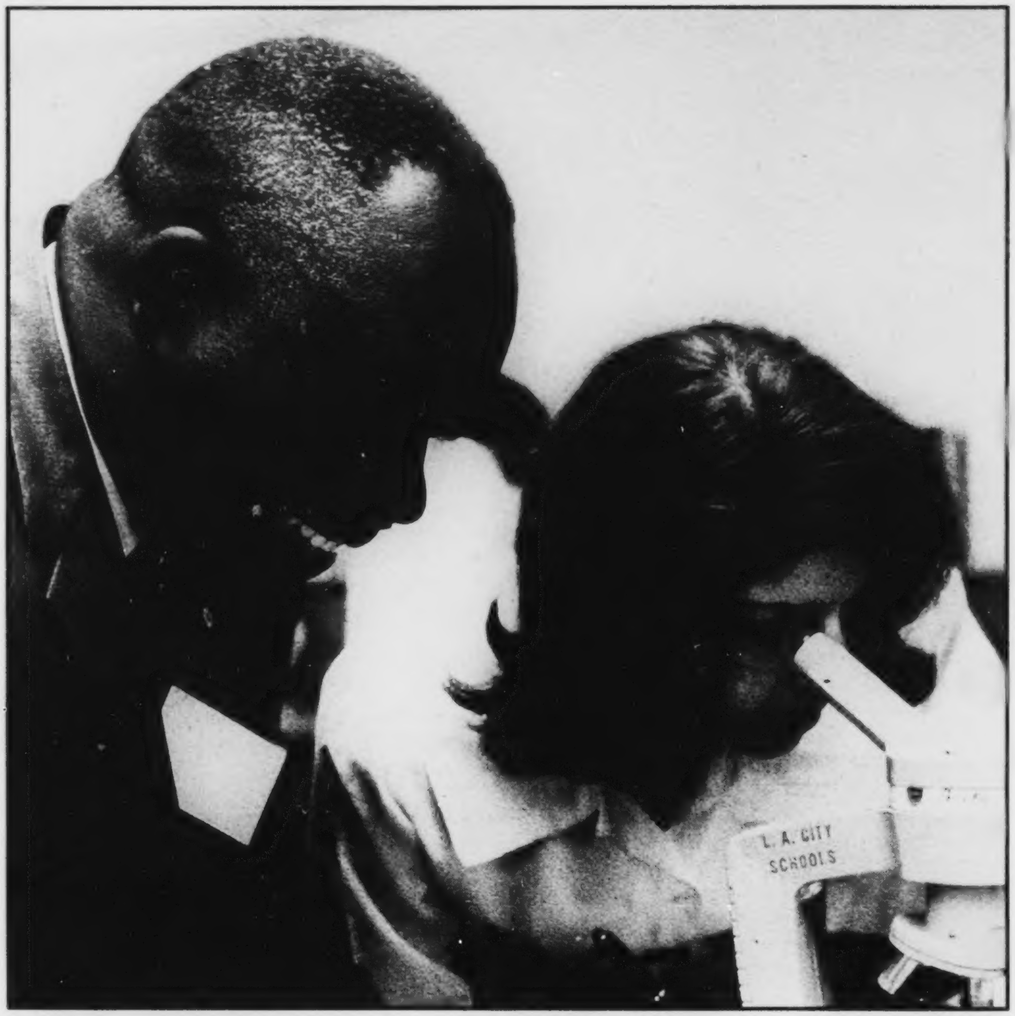
SUMMARY OF AWARDS

Teacher Enhancement
Active Awards Fiscal Year 1994



Division of Elementary, Secondary, and Informal Education

NATIONAL SCIENCE FOUNDATION **1995**

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Since its inception in 1950, the National Science Foundation (NSF) has served the nation by investing in research and education in all aspects of science, mathematics, engineering, and technology. Although all NSF Directorates play a vital role in supporting education, the Directorate for Education and Human Resources (EHR) has primary responsibility for developing and managing education programs. Its goal is to provide *all* students access to quality science, mathematics, and technology (SMT) education.

Within EHR, programs of the Division of Elementary, Secondary, and Informal Education (ESIE) reach students in classrooms (pre-kindergarten through grade 12) across the United States through improved instructional materials and enhanced preparation of teachers; the provision of research experiences for high-potential and high-ability youth; and increased public science literacy.

This book describes all projects of the Teacher Enhancement (TE) program that were active awards as of 1995. Strengthening the teaching workforce is a critical means for reaching students in today's classrooms. The Foundation's TE program enhances the disciplinary, pedagogical, and leadership skills of SMT teachers, as well as actively involving administrators and others who play significant roles in ensuring quality education to all students. Evolution of the program through the years has guided the field in adopting best practices, lead to replication of effective models, and identified new strategies for broadening impact. Currently, TE supports five major categories of projects:

1) ***Local Systemic Change***—support the reform of SMT education in grades K–8 and mathematics in grades 7–12 in school districts through the professional development of teachers within the context of whole-school organizations.

2) ***Teaching*** *Enhancement*—expose participants to appropriate content, pedagogy, and leadership skills, as well as knowledge of quality curriculum materials and educational technologies and ensure the support for implementing classroom improvements.

3) ***Replication and Infrastructure***—develop the infrastructure and resources to support the reform of SMT education.

4) ***Professional Development Materials***—develop materials to enhance teachers' ability to provide effective, standards-based instruction using state-of-the-art student materials, assessment strategies, and educational technologies.

5) ***Professional Support for the Teaching Workforce***—develop a community where teachers pursue lifelong learning not only through formal education but also through continued interactions with their peers, teacher educators, scientists, mathematicians, engineers and technologists, the informal science community, and the private sector.

We appreciate the considerable expertise and good judgment brought to the recommendation for funding of these proposals by the review panels consisting of teachers, supervisors, and educators, as well as practicing scientists, mathematicians, and technologists. Questions or comments should be made to the

Teacher Enhancement Program
National Science Foundation
4201 Wilson Boulevard, Room 885
Arlington, VA 22230
(703) 306-1613

ALABAMA

An Integrated Mathematics/Science Enhancement Program for Middle School Teachers

Award number:	9255754
Funding:	$433,322
PI:	Gladiola Dale
Co-PI:	LaJoyce H. Debro
Institution:	Jacksonville State University, Jacksonville, AL
Dates:	January 1, 1993–June 30, 1996

This project enhances the skills of 160 middle school teachers of mathematics and science. A science and mathematics teacher team from each middle school participates in a 6-week summer institute that emphasizes integrated applications and ways to achieve desirable outcomes through skillful reading techniques. During the institute, participants take courses in mathematics and laboratory experiences, and they engage in hands-on experiments. Courses and experiments are taught by teams of mathematicians, educators, and laboratory-assisted scientists. In addition, participants attend weekly seminars on the use of the latest technologies. Cost-sharing is equivalent to 10 percent of the NSF award.

Improving Mathematics Teaching in Grades 6–9 Through the Integration of Content, Technology, and Manipulatives

Award number:	9155296
Funding:	$534,480
PI:	Tommy Smith
Co-PIs:	Ann C. Shelly, Gary L. Sapp
Institution:	University of Alabama–Birmingham, Birmingham, AL
Dates:	September 1, 1992–February 29, 1996

A cooperative venture involving the Department of Mathematics, the School of Education, and six school districts in the Birmingham, Alabama, area is enhancing the mathematical content and pedagogical skills of 20 middle school mathematics teachers. Teachers participate in an intensive 5-week workshop where the use of hands-on materials and computer software is stressed in topics ranging from prealgebra and pregeometry to probability and statistics. Four follow-up workshops are held in the following academic year, as well as at least two site visits by project faculty to each participating teacher's classroom.

Each participating teacher selects a teacher from his or her school to mentor during the academic year and with whom to share ideas and teaching methodologies experienced in the summer workshop. All project teachers and those affected through the partnership-mentoring program become part of a network, "Mathematics Teachers Helping Teachers," where they continue to function with the support of the university after the completion of the project. Cost-sharing is 9 percent of the NSF award.

Training Laboratory Managers: A Comprehensive Experience for High School Chemistry Teachers

Award number:	9253239
Funding:	$512,905
PI:	Lee R. Summerlin
Co-PI:	Larry K. Krannich
Institution:	University of Alabama–Birmingham, Birmingham, AL
Dates:	November 15, 1992–April 30, 1997

This project provides a program to teach 30 outstanding high school chemistry teachers laboratory techniques. Participants learn all phases of chemistry laboratory operations with an emphasis on laboratory management and safety. At the end of the program, these teachers are certified as Laboratory Management Specialists and will provide in-service training for other teachers. The project's follow-up component supports the teachers as they conduct in-service work. The matching funds from the university and participating schools is 27 percent of the NSF award.

Huntsville Elementary Science Program

Award number:	9254410
Funding:	$901,671
PI:	John Wright
Institution:	University of Alabama–Huntsville, Huntsville, AL
Dates:	May 1, 1993–October 31, 1995

Forty-two schools in two school districts near the University of Alabama–Huntsville are implementing a hands-on, inquiry-based K–5 science curriculum using nationally validated instructional materials. Each school selects these leader/master teachers on the basis of potential leadership, dedication to science, willingness to help other teachers, and prior experience in teaching hands-on science. This cadre of leader/master teachers are training teams of teachers, principals, and school resource scientists to use the kit-based materials. The school districts are creating a materials management program to refurbish and distribute the *STC* and *EDC-Insights* materials for every classroom. Cost-sharing is 47 percent of the NSF award.

ARIZONA

Science Consultant Program for Navajos in Northwest New Mexico

Award number: 9153926
Funding: $372,421
PI: Mark Bauer
Co-PI: Steve Grey
Institution: Navajo Community College, Shiprock, AZ
Dates: September 1, 1991–February 29, 1996

Aimed at increasing the participation of Native Americans in science, this project includes (1) the use of Navajo or other Native American scientists, from the Lawrence Livermore and the Los Alamos National Laboratories, and engineers as career and personal role models for youths, (2) summer teacher workshops, (3) comprehensive evaluation, and (4) a leadership role for the college in disseminating the fruits of its work to other Native American colleges. At the end of the project, outreach and dissemination efforts will include invitational conferences for the contiguous reservation areas and for all like colleges. Cost-sharing is 58 percent of the NSF award.

Making Everybody Count: Transforming the Middle School Mathematics Classroom

Award number: 9155284
Funding: $748,769
PI: David A. Gay
Co-PI: Deborah Yoklic
Institution: University of Arizona, Tucson, AZ
Dates: September 1, 1992–February 28, 1997

This project is enhancing the mathematical and pedagogical competence and leadership skills of 90 middle school teachers. Special emphases include encouraging minorities and women in mathematics, using technology in mathematics, and exploring connections of mathematics to other areas. Each teacher attends two summer workshops (one 4-week and one 2-week) and is engaged in academic-year activities to support classroom implementation and further develop leadership skills. Courses in the summer workshops are co-taught by university faculty and classroom teachers. Teachers participating in the project provide outreach and support for other teachers. The university and schools are providing a cost-share of 34 percent.

Image Processing for Teaching: Development for National Dissemination

Award number: 9253331
Funding: $1,724,647
PI: Richard J. Greenberg
Co-PI: Robert G. Strom
Institution: University of Arizona, Tucson, AZ
Dates: October 1, 1992–March 31, 1996

This project disseminates nationally the image-enhancement materials and techniques developed at the University of Arizona. These materials allow students and teachers to scan images, or to select one of thousands already available, and do enhancement and analysis. The images are drawn from many fields and support exploration and discovery related to all areas of science as well as many areas of mathematics. The project develops a curriculum for in-service workshops for teachers of grades 5–12. Multimedia materials on CD-ROM accompanied by video and print materials support the sites that adopt the technology. A national structure disseminates the materials and promotes further development of applications by teachers and students. An initial core group of 90 expert teachers participates in the dissemination and training. The grant includes funds to support 80 teachers per year from either districts that cannot afford the workshops or those that teach targeted underrepresented groups.

Modeling Instruction in High School Physics

Award number: 9353423
Funding: $4,000,000
PI: David Hestenes
Co-PIs: Malcolm Wells, Greg Swackhamer, Larry Dukerich
Institution: Arizona State University, Tempe, AZ
Dates: January 15, 1994–August 31, 1998

This national leadership project, which directly serves 168 physics teachers, is based on a new paradigm for physics instruction, the Modeling Method. In phase I, each of two 6-week summer workshops enrolls 24 physics teachers. Ten of these 48 teachers are selected as workshop leaders for phase II. In phase II, five 5-week workshops are conducted by two-person workshop leader teams. Fifty new workshop leaders are selected. In phase III, the 60 workshop leaders will each conduct a 6-week workshop for teachers covering the entire curriculum, using the modeling method. Participants must teach at least one section of physics using the modeling method during the following academic year. In both phase I and phase II, participants can earn graduate-level credits. Cost-sharing equals 120 percent of the NSF award.

University of Arizona Biology Teaching Project

Award number: 9155220
Funding: $890,858
PI: Martha L. Narro
Co-PIs: Martinez J. Hewlett, William F. Larson, Walter Doyle
Institution: University of Arizona, Tucson, AZ
Dates: September 1, 1992–February 28, 1998

This project provides in-service education to enhance middle and high school teachers' content knowledge in the biological sciences, increase their research experience, and increase their experience in developing and using hands-on student activities. Courses for participating teachers offered at the university include the study of exemplary curricula, the study and modification of the introductory biology laboratories, research opportunities in biology and education, biological pedagogy, developing hands-on lessons, and special topics in biology. All activities are designed to maximize interaction between precollege science teachers and university faculty in the biological sciences and education. Stipends are provided for participants, and graduate-level credit is given for all activities. One hundred fifty teachers in Tucson and surrounding communities participate in project activities. Master teachers, selected from the project, conduct 1-week workshops during the academic year for other teachers in the state. These workshops serve 270 additional teachers in Arizona. Cost-sharing equals 98 percent of the NSF award.

Western Regional Program for Precollege Biological Science Education

Award number: 9155294
Funding: $881,727
PI: T. Lon Owen
Co-PI: Marcia E. Fischer
Institution: Northern Arizona University, Flagstaff, AZ
Dates: September 15, 1992–February 28, 1998

This project provides in-service education in the areas of cellular and molecular biology and biotechnology for 192 (48 per year) general and advanced-level high school biology teachers from Arizona and surrounding states. Special attention is given to the recruitment of teachers of minority students and to the needs of minority students. Emphasis is placed on giving biology teachers the competency and confidence to use modern biotechnology while incorporating laboratory investigations and computer and media technology in the biology classroom. The program, which is based on several years of pilot study, includes a 3-week summer institute and an academic-year follow-up. Highly qualified, experienced, precollege teachers provide a significant portion of the institute instruction. Participants are required to share activities with fellow teachers via local in-service activities. Cost-sharing equals 9 percent of the NSF award.

An Advanced Elementary Science Leadership Institute

Award number: 9353237
Funding: $75,000
PI: Susan Sprague
Co-PIs: Nancy Thomas, Jan B. Loveless
Institution: Mesa Foundation for Educational Excellence, Mesa, AZ
Dates: August 1, 1993–July 31, 1995

The Mesa, Arizona, Public School District is a national leader in promoting the use of hands-on inquiry-based science teaching in elementary schools. The Mesa approach to elementary science is one of the models used by the National Science Resources Center in the NSF-supported *Leadership Institute* that has been attended by teams from 126 school districts. These districts, as well as other districts that are implementing changes inspired by the Mesa model, encounter many of the same barriers to organizational change, the same logistical problems relating to science materials in the classroom, and the same questions concerning professional development of teachers and school administrators.

For this reason, a 3-day Advanced Leadership Conference for teams from districts that are implementing change efforts in elementary science is being hosted. Dow Chemical and Hewlett-Packard have supported the change efforts in many of these districts, and both companies are contributors to the conference. The conference focuses on three strands: organizational change, management of science materials centers, and staff development. This conference facilitates (1) advanced training by staff from exemplary districts, (2) sharing of ideas and strategies among the districts that are implementing change, and (3) formulation of widely applicable change indicators and a model for technical assistance to school districts. The conference has an excellent format, an outstanding leadership team, and a solid plan for disseminating the results of the meeting. The potential impact of this conference extends beyond the districts that are sending representatives. Cost-sharing for this project is 125 percent of the NSF award.

Project PRIME: Promoting Reform in Mathematics Education

Award number: 9253845
Funding: $1,267,924
PI: Elias H. Toubassi
Co-PIs: Fred Stevenson, Kowk Chow
Institution: University of Arizona, Tucson, AZ
Dates: July 1, 1993–December 31, 1995

The University of Arizona and the school districts of the greater Tucson area provide in-service training to 90 elementary and middle school teachers in three summer institutes as well as activities during the school year. The project establishes teams composed of one middle school teacher and two elementary teachers to integrate the teaching of grades 3–7 mathematics with problem solving and technology; examines current research and exemplary materials; and develops strategies for implementing current practices in their classrooms.

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ARKANSAS

Arkansas STRIVE: A Joint Venture for Math/Science Teacher Enhancement Through Involvement in Research

Award number:	9254577
Funding:	$577,058
PI:	Gaylord M. Northrop
Co-PI:	L.D. Milne
Institution:	University of Arkansas–Little Rock, Little Rock, AR
Dates:	March 1, 1993–August 31, 1996

This project is building a self-sustaining program to place secondary mathematics and science teachers in research positions in university or industrial laboratories. *Arkansas STRIVE* has developed from a pilot program, which was supported both by NSF funds through Oak Ridge Associated Universities (ORAU) and by six Arkansas businesses and institutions. The program provides research experiences for at least 50 secondary mathematics and science teachers per year. The teachers engage in research for 7 weeks and then gather at a central location to spend 1 week developing curriculum, planning for improvement in their personal pedagogical activities, and contributing to the preparation of a "Recommendation for Curriculum Change" report in their respective areas of life science, physical science, or mathematics/computer science. A minimum of five more meetings are scheduled during the academic year, and participants are each responsible for serving as a mentor to five other teachers in their schools or school districts. Research workshop participants create video, computer, and other materials that are made available to teachers throughout Arkansas and nationally. Cost-sharing is 94 percent of the NSF award.

CALIFORNIA

UC–San Francisco Science Institute for Elementary Teachers

Award number: 9055453
Funding: $2,772,498
PI: Bruce M. Alberts
Co-PIs: Arthur J. Sussman, David M. States, Janet L. Tuomi
Institution: University of California–San Francisco, San Francisco, CA
Dates: July 15, 1991–June 30, 1995

This project is an integral component of the San Francisco Unified School District's comprehensive plan for K–5 science improvement. Through month-long education sessions, the content of elementary science is modeled to 100 teachers by excellent hands-on science teaching. These teachers become the UCSF Science Partners who support their fellow classroom teachers as they implement the city's new hands-on curriculum. In partnership with K–5 Science Support Teachers and the City's Science Specialists, the UCSF Science Partners provide presentations, demonstrations, and team-teaching with colleagues during the site-institute at their own schools. In addition, the 100 UCSF Science Partners will be teamed by grade levels to provide workshops on specific grade-level model science units to teachers throughout the system. The cost-sharing is 47 percent of the NSF award.

Supercomputer Teacher Enhancement Project (STEP)

Award number: 9253243
Funding: $1,602,632
PI: Donald W. Anderson
Co-PI: Robert A. Dean
Institution: University of California–San Diego, San Diego, CA
Dates: January 1, 1993–June 30, 1996

STEP trains 46 teachers in the San Diego area. Six of the teachers are lead teachers who receive extensive training, at university expense, at the Lawrence Livermore Laboratories prior to the start of the project. The six lead teachers serve as teaching assistants working with the other 40 participating teachers. The participating teachers learn the basics of computational science, programming, and high-performance computing and then are each expected to share and work with 10 other teachers in their schools. They learn to use computing at many levels, to incorporate computational science into their curriculum, and to develop activities or projects for students. The teacher training consists of a 3-week summer workshop, academic-year meetings, and visits to local facilities. Through the combined efforts of the universities, the local school districts, the supercomputing center, and the community, the project directly affects students in urban and similar schools in the San Diego area with a high number of minority students. The project targets underrepresented teachers and teachers of students who are traditionally underrepresented.

Primary Leadership Institute in Science and Mathematics (PRISM)

Award number: 9253185
Funding: $932,427
PI: Jacqueline Barber
Co-PI: Linda Lipner
Institution: University of California–Berkeley, Berkeley, CA
Dates: January 1, 1993–December 31, 1996

Project *PRISM* is designed for teams of K–3 teachers and teacher educators nationwide. Based on a previously NSF-funded project, *PRISM* provides education in both content and instructional strategies and prepares teachers to serve as specialists and providers of in-service education. A 4-week summer institute providing 120 hours of educational enhancement to 30 teachers and specialists is offered each year. During the academic year, participants receive a regular newsletter and mini-grants to support school-year leadership activities, and they attend leadership conferences. A new facet of this project is the involvement of 20 teacher educators each project year from institutions nationwide. These teacher educators attend the *PRISM* Institute for 1 week to receive in-service training specific to adapting the *PRISM* model for use with teachers in their areas. The project has far-reaching impact, not only through the efforts of teacher participants, but also through the pre-service education and through classroom teachers reached by participating teacher educators. Cost-sharing is 28 percent of the NSF award.

ACOT (Apple Classrooms of Tomorrow) Teacher Development Centers

Award number: 9253268
Funding: $1,165,522
PI: Harvey Barnett
Co-PIs: David C. Dwyer, Keith Yocam
Institution: Cupertino Union School District, Cupertino, CA
Dates: September 1, 1992–February 29, 1996

This project continues the work of the NSF-supported *Apple Classrooms of Tomorrow* into extended projects to provide teacher enhancement in three school districts: Cupertino, California; Nashville, Tennessee; and Columbus, Ohio. These districts range from 35 to 54 percent minority students. One of the districts, Nashville, has considerable experience with *ACOT* and training and is the lead district in most activities. The project helps a large number of teachers gain experience in the use of technology in instruction. The focus is on inquiry-based, collaborative, and knowledge-building tasks in mathematics, science, history, and language arts. Four-week summer institutes and week-long academic-year sessions train 648 teachers directly and 1,300 teachers indirectly.

Marine Activities, Resource and Education (MARE): A Teacher Enhancement Program

Award number: 9254642
Funding: $1,079,259
PI: Katharine Barrett
Institution: University of California–Berkeley, Berkeley, CA
Dates: May 15, 1994–April 30, 1997

The Lawrence Hall of Science and the University of Texas at Austin's Marine Science Institute are collaborating on a marine science teacher enhancement program that serves 912 K–8 teachers in exemplary methods of science and mathematics instruction and provides 17,600 students and their teachers in California and Texas with increased knowledge of ocean ecosystems. This model, which is specifically designed to make science instruction accessible to language-minority students, is being implemented in four urban school districts, two in California and two in Texas. Leadership teams from eight California schools and six Texas schools attend summer institutes that introduce teachers to marine science education integrated with mathematics and other areas of science. The teachers also have assistance as they plan for the improvement of the total science program of their buildings. During the school year, the lead teachers assist the *MARE* staff in conducting whole-faculty in-service sessions to share the project and the teaching strategies with their colleagues. They also lead faculty planning sessions for the whole-school "Ocean Week" immersion event, which is the highpoint of the year-long marine science project at each site. During the final year, the district leadership teams adopt eight new schools in California and six new schools in Texas. The cost-sharing is 35 percent of the NSF award.

Evolution and the Nature of Science

Award number: 9155259
Funding: $1,669,323
PI: Jean Beard
Co-PIs: Martin K. Nickels, Craig Nelson
Institution: San Jose State University Foundation, San Jose, CA
Dates: May 1, 1992–June 30, 1997

Building on the success of a previous teacher enhancement project, this project is developing a leadership program that serves as a national model for the dissemination of knowledge and pedagogical techniques in the subject areas of evolution and the nature of science. The project (1) improves the quality of instruction of the nature of science and evolution, (2) encourages and enables biology teachers to begin these matters and to integrate them throughout the biology course, (3) demonstrates how the use of humans as biological examples can enhance student interest and learning, and (4) assists teachers in developing a more dynamic teaching methodology. Applications emphasize a shift in laboratory focus toward exploratory activities. In addition, the use of cooperative learning, concept mapping, and textbooks as reference sources is encouraged.

Thirty teachers per year participate in the *Evolution and the Nature of Science* Institute (ENSI) and two follow-up sessions. Six teams of lead teachers, who are selected and trained in a "Lead Teacher Preparation Program," present 40 2-week satellite ENSI's over the life of the project. In total, 890 teachers from the midwestern and western United States participate in the program. Cost-sharing is 42 percent of the NSF award.

San Jose Mathematics Leadership Project

Award number: 9155282
Funding: $881,868
PI: Joanne R. Becker
Co-PI: Barbara J. Pence
Institution: San Jose State University Foundation, Blacksburg, CA
Dates: April 15, 1992–September 30, 1996

This mathematics project develops and evaluates a model professional development program for high school mathematics teachers from 20 schools in three districts in the San Jose, California, area. The project is designed to provide 80 teacher leaders with the knowledge, skills, and understanding necessary to lead implementation of curriculum innovations in their schools.

Participants are involved in three levels of summer institutes and extensive academic-year follow-up sessions that involve leadership training, staff and peer coaching, demonstration lessons, micro-teaching, reflection about teaching and learning mathematics, and development of site-based professional development centers. Participants refresh and enhance their content knowledge, teach and evaluate innovative curricula, work to integrate technology into their teaching, and use analysis and application of mathematics-education research, reflective essays, journals, peer coaching, and discussions to reflect on and broaden their beliefs about teaching and learning mathematics. The participants present in-service education to other teachers and become coordinators of the professional development centers, which serve as the sites for the schools' ongoing programs for staff development and curricular and instructional change after the project ends. Contributions by the university and school districts provide a cost-share of 39 percent of the NSF award.

Science Enrichment Collaborative

Award number: 9155457
Funding: $400,000
PI: Anne Bouie
Institution: Interface Institute, Oakland, CA
Dates: April 15, 1992–September 30, 1996

Interface Institute is expanding and developing a project that began with the support of the Edna McConnell Clark Foundation, which targets Black and Hispanic middle school teachers and youth in the Elmhurst District of East Oakland, California. The project (1) expands the network of scientists and corporate representatives working directly with teachers and students through classroom visits, field trips, job shadowing, and mentoring; (2) designs and distributes hands-on materials, activities, and demonstrations to enhance the California State Science Framework (CSSF) curriculum; and (3) involves an increasing numbers of students in after-school programs that support classroom work based on the CSSF. Cost-sharing is 155 percent of the NSF award.

Hands-On Science in Pasadena: Middle School Extension

Award number: 9253237
Funding: $570,804
PI: James M. Bower
Co-PI: Jennifer Yure
Institution: California Institute of Technology, Pasadena, CA
Dates: December 15, 1992–November 30, 1995

Based on a prior NSF-funded project, *Science for Early Educational Development (SEEDS)*, this project trains middle school teachers in the use of hands-on, inquiry-based science kits, establishes a materials support system for refurbishment of kits, engages scientists from the community in teacher workshops and in classroom activities, and encourages integration of science with other curricular subjects through additional summer workshops. This project creates a comprehensive and integrated K–8 science curriculum for the public schools in Pasadena and prepares all middle school teachers responsible for science instruction to deliver exemplary learning experiences. The expansion of project *SEEDS* enhances all middle school teachers in Pasadena's Unified School district thus directly affecting 3,500 students. Cost-sharing by the university and school district is 104 percent of the NSF award.

Leadership Institute for Teaching Elementary Science (LITES)

Award number: 9353453
Funding: $2,337,882
PI: Jane Bowyer
Co-PI: June Hopkirk
Institution: Mills College, Oakland, CA
Dates: September 15, 1993–February 28, 1999

This project targets all 1,050 elementary teachers in the 60 schools of the Oakland, California, district, which serves a large, multiethnic student population. As a broad-based coalition of college, industry, and science-center scientists, *LITES* involves college, school, community, and family educators. For 5 weeks each year for 2 years, 180 leader teachers participate in a research-based *LITES* curriculum. They, in turn, train a school-site cluster of five same-grade-level colleague teachers. Key features of the *LITES* curriculum are (1) a linkage of four informal science centers to teach a 4-day thematic science course on ecosystems in environments, (2) a technology course taught in an industry setting where teachers can learn first-hand the complex concepts in this discipline, and (3) an integration of pedagogy and science subject-matter courses combined with practical classroom experience. The leader teachers are assisted by a team of 29 *LITES* staff who provide school-site support. Seventy-two teachers who have participated in a pilot of the *LITES* program serve as consultants to the leader teacher/colleague teacher clusters. Cost-sharing is 70 percent of the NSF award.

Early Equity in Science and Mathematics

Award number: 9155312
Funding: $513,739
PI: Phyllis Brady
Institution: Office of Santa Barbara County Superintendent of Schools, Santa Barbara, CA
Dates: July 15, 1992–December 31, 1995

Ninety elementary and preschool teachers from Santa Barbara, Ventura, and San Luis Obispo counties participate in leadership training in science and mathematics education. These teachers are drawn from schools with large minority enrollments, and the training focuses on modifying existing instructional materials and developing new materials that address the multicultural, socioeconomic, physical disability, and gender equity issues. The workshops provide the participating teachers with science and mathematics content and current teaching methods in early childhood science and mathematics education. This training experience allows teachers to develop strategies for improving equity of access to science and mathematics for children of diverse backgrounds. Teachers then train and work with colleagues in their respective schools to extend the impact of their training. The school districts provide release days for teachers to participate in training. The cost-sharing is 17 percent of the NSF award.

A Model System for the Science Education of Diverse Populations

Award number: 9155270
Funding: $797,295
PI: Klaus R. Brasch
Co-PIs: Herbert K. Brunkhorst, Iriss Riggs, Esteban Diaz
Institution: California State University–San Bernardino Foundation, San Bernardino, CA
Dates: August 15, 1992–January 31, 1996

This leadership project, in partnership with local industry scientists and engineers, is designed to address the science education needs of a local district with 59 percent minority (largely Hispanic) students. Eighty teachers and 20 bilingual aides of grades 3–6 participate in three academic quarters of weekly meetings at which they receive training from scientists and science educators in science content and pedagogy. In-service education focuses on *FOSS* materials, which form the basis of the school science curriculum, and on strategies designed to develop language skills (in science) of bilingual and non–English-speaking children. The cost-sharing amount is 15 percent of the NSF award.

Teachers + Occidental = Partnership in Science (TOPS)

Award number:	9153762
Funding:	$800,278
PI:	Chris L. Craney
Co-PIs:	Laura L. Hoopes, Tetsuo Otsuki, Eleanor Odden
Institution:	Occidental College, Los Angeles, CA
Dates:	August 1, 1991–January 31, 1997

This project provides two 2-week summer workshops for 15 teachers in chemistry and 15 teachers in biology each summer. The summer workshops provide training in discipline concepts and the use and development of laboratories employing modern instruments. The academic-year program features a highly trained lead teacher who visits each school once a month, bringing a van equipped with the instruments previously used by the teachers. Other follow-up activities include development of a network among the participants, a seminar series, a research associates' program (teachers are selected to carry out research with college faculty), a science-information clearinghouse, and a best experiment competition. The target schools enroll a large number of minority students. The project evaluation looks at whether a technology-focused laboratory program increases the number of students interested in pursuing science careers. Matching funds from Occidental College are equivalent to 32 percent of the NSF award.

Science Institute for Elementary School Teachers

Award number:	9154836
Funding:	$1,086,328
PI:	David W. Deamer
Co-PIs:	Richard L. Nuccitelli, David J. Hammond
Institution:	University of California–Davis, Davis, CA
Dates:	December 1, 1992–March 31, 1996

This project is based on a previous, NSF-funded project at the University of California–San Diego. The Institute invites 75 elementary school teachers identified as leaders to participate in the program. Teams of two or three teachers from each participating school participate each year in a 4-week summer institute followed by eight monthly Saturday seminars during the academic year. During the summer institutes, participants attend lectures and laboratories on biological science, earth and space science, and physical science, and during the Saturday sessions of the academic year, teachers focus on the integration of these disciplines into themes suggested by the *California Science Framework*. Outstanding UCD scientist–educators emphasize major concepts and principles in an interactive setting that uses demonstrations and small- and large-group discussion, and master teachers and science educators work with participants in adapting exemplary curricular materials to correlate with the *California Model Curriculum Guide* and the *California Science Framework*. Districts are providing support in the form of release time, space, and materials. Participants are expected to act as resources to their schools and districts and to provide in-service workshops for other classroom teachers, reaching 2,300 teachers.

Functions and Transformations: Higher Order Mathematics (FATHOM)

Award number:	9254633
Funding:	$450,348
PI:	Janice Eckmier
Institution:	California State University–Northridge, Northridge, CA
Dates:	June 15, 1993–November 30, 1996

This project develops 40 grade 5–6 mentor teachers and 480 partner teachers from grades K–6 in prealgebra, geometry, and data-analysis content and uses inquiry-based methodology and alternative assessments. In this California State University–Northridge/Los Angeles Unified School District partnership, special attention is given to skills in teaching minority and Limited English Proficiency students, who constitute the majority of the student population. Participants experience residential institutes, workshops, midweek seminars, and teacher-leader in-service opportunities, using the *NCTM 1990 Yearbook* sandwich model of classroom trials between the workshops and follow-up sessions.

Extending Science Education: Teaching With and About Technology

Award number:	9155340
Funding:	$384,054
PI:	Judith Fritz
Institution:	Tech Museum of Innovation, San Jose, CA
Dates:	May 15, 1992–October 31, 1995

Each year, 20 middle school and 20 high school science teachers from California work with industry experts and museum staff to learn about the latest technology innovations and developments. Summer workshop activities give participants access to industry research-and-development facilities and provide them with behind-the-scenes tours and hands-on laboratories. The museum replicates industry applications of biology, computer science, chemistry, physics, and mathematics. Activities based on these real-world applications are developed by 40 four-person teams, each consisting of the project participant and three other teachers of science. The team is supported by a midyear teleconference of participants, project staff, and industry experts; at least one half-day coaching visit; and as-needed consultation by project staff and industry experts. Each of the 120 participants receives a publication containing all 120 activities, and each team presents its activity at a spring fair open to all teachers and community members. Cost-sharing by the museum, school districts, and industry is 89 percent of the NSF award.

A Novel Interdisciplinary Science Teacher Education Program for the Los Angeles Unified School District with a Marine Science Thematic Approach

Award number:	9153769
Funding:	$1,157,959
PI:	William M. Hamner
Co-PIs:	David J. Chapman, Sid Sitkoff
Institution:	University of California–Los Angeles, Los Angeles, CA
Dates:	February 1, 1992–July 31, 1995

This project is designed to infuse marine science into a restructured general science curriculum that can serve as a model to be replicated in all the schools in the district, where the student population is 80 percent underrepresented. The model trains a selected group (40 each year) of Los Angeles Unified School District teachers of grades 5–12, who are required to function as peer trainers in the district. Training focuses on an integrative curriculum with a thematic emphasis on marine science. The program is guided by various educational resources that are available through the consortium. It is being implemented by the consortium and UCLA extension services partnership at various institutional sites and the Fort MacArthur Marine Studies Center. The cost-sharing is 41 percent of the NSF award.

Jaime Escalante Math Program (JEMP)

Award number:	9155456
Funding:	$363,565
PI:	Chris Hasegawa
Co-PI:	Edward Arnsdorf
Institution:	Sacramento City Educational Foundation, Sacramento, CA
Dates:	September 1, 1993–February 29, 1996

This project implements *JEMP* at Hiram Johnson High School and its West Campus and feeder middle schools in the Sacramento City Unified School District (SCUSD). Two high school teachers are being trained in the methodology and strategies used by Mr. Escalante. This training is done during the academic year in a series of Saturday workshops taught by Mr. Escalante. These project associates and Mr. Escalante will team teach three classes of 30 students each during the summers. This project also includes a series of 1-day presentations on *JEMP* to teachers at the elementary schools in the SCUSD that are feeders for the middle schools. Cost-sharing is 177 percent of the NSF award.

Teaching with 4D: Diversity, Dialogue, Dimensions, and Design

Award number:	9353411
Funding:	$1,444,565
PI:	Theresa Hernandez-Heinz
Institution:	San Francisco Unified School District, San Francisco, CA
Dates:	June 1, 1994–May 31, 1998

This project aims at providing students—especially at-risk, minority students—greater access to challenging, high-level mathematics courses. The project prepares 155 teachers at four large San Francisco High Schools to implement two new exemplary mathematics curricula: Course A of the *California Mathematics Framework* and the NSF-funded *Interactive Mathematics Project* (*IMP*) materials. The program provides teachers appropriate content knowledge (including topics from probability and statistics, geometry, trigonometry, and mathematical modeling) and stresses problem-solving, applications of graphing calculators, cooperative learning, the uses of journals and portfolios, and alternative assessments. The project has three basic components: (1) a 1-week summer program focusing on mathematical content; (2) intensive support during the school year (including a daily, special, common preparation period for participating teachers), on-site visits by staff, group meetings and conferences with staff, and ongoing staff efforts to maintain and nurture support from school administrators; (3) an "After-the-Bell Program," especially for at-risk students, featuring after-school involvement of parents, peer tutoring, field trips, and a homework "hot-line." To prepare the participants to become leaders in mathematics reform in San Francisco, the program provides many opportunities to develop, exercise, and improve their leadership skills. An external evaluation looks at the effectiveness of the implementation model and focuses on student outcomes, such as increased enrollment—and success in—demanding, high-level mathematics courses. Cost-sharing is 64 percent of the NSF award.

Bridging Preschool and Kindergarten through Teacher Enhancement in Science and Mathematics

Award number:	9353447
Funding:	$912,133
PI:	Kimi Hosoume
Institution:	University of California–Berkeley, Berkeley, CA
Dates:	April 1, 1994–March 31, 1998

This project develops, conducts, and disseminates a science and mathematics content and methods institute for preschool and kindergarten teachers in the San Francisco Bay area and the nation. The curriculum is based on the *PEACHES* and *GEMS* instructional materials. Project activities include introduction to science and mathematical concepts through the life and physical sciences, participation in hands-on science and mathematics experiences integrated with language arts, introduction to appropriate instructional strategies for young children, participation in early childhood professional conferences in the area of science and mathematics, and presentation of orientation sessions on project curriculum by participants to teachers and parents at their schools. The project develops and conducts three summer institutes, each 3 weeks in length and enrolling 40 preschool and kindergarten teachers. In addition, two academic-year sessions are conducted each year for project participants to carry out dissemination to the schools. Fifty parents, administrators, and teachers from participants' schools are involved in one academic session each year at the Lawrence Hall of Science. The *Handbook for Early Childhood Science and Math Explorations* for teachers and parents will be revised and published by the end of the project.

Teacher Institute for Using Computer Visualization for Teaching Mathematics

Award number:	9254634
Funding:	$1,049,076
PI:	Linda Huetinck
Institution:	California State University–Northridge Foundation, Northridge, CA
Dates:	May 1, 1993–October 31, 1995

This master's degree program is designed to train two groups of 40 high school mathematics teachers to provide leadership in modernizing mathematics teaching in the greater Los Angeles area. The project includes the study of mathematical content, pedagogical issues, and leadership skill development. It focuses especially on the importance of visualization in mathematics—emphasizing applications of computers and graphing calculators. The project format consists of a 2–3 week summer institute, a 3-semester-hour course in the fall, a 2-day winter workshop, and a course meeting for three long weekends in the spring. The focus is on mathematical content, alternative teaching styles, technology and its applications in the classroom, adaptation and implementation of curricular materials while observing and documenting changes in themselves and their students, and enhancing leadership skills. Participants are expected to give presentations at local conferences, give in-service workshops, and with project staff, hold local teacher conferences. A master's thesis is required for the degree. Participants are supported in their implementation, dissemination, and reform efforts by means of electronic networking, periodic meetings, and a newsletter.

Scientists in the Making

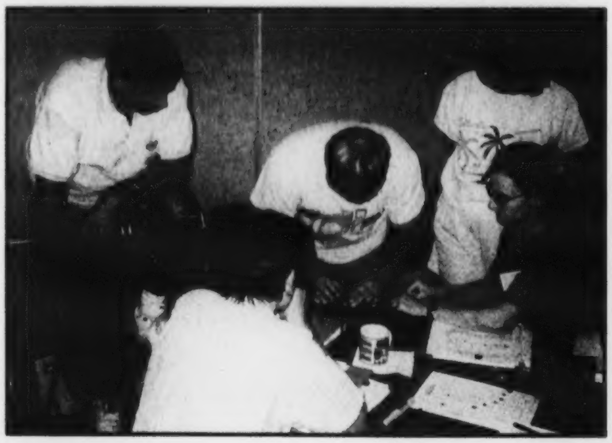
Award number:	9155697
Funding:	$398,281
PI:	Barbara W. Huntington
Co-PI:	Raul Alvarado
Institution:	Long Beach Unified School District, Long Beach, CA
Dates:	June 1, 1992–November 30, 1997

This project is providing students with workplace experiences that are connected to principles they learn in the classroom. By augmenting the existing curriculum, the project is (1) integrating the study of workplace applications into regular grade 9 classroom instruction, (2) developing a mentor program for grade 9–10 students, and (3) providing internships and work experiences for grade 11–12 students.

Interdisciplinary System for the Study of Urban Environmental Science (ISSUES)

Award number:	9253316
Funding:	$1,074,962
PI:	Raymond V. Ingersoll
Co-PIs:	William I. Gustafson, Janet M. Thornber, Joan Clemons
Institution:	University of California–Los Angeles, Los Angeles, CA
Dates:	February 1, 1993–January 31, 1996

This project is recruiting 264 secondary school master science teachers from the Los Angeles area to participate in a 3-week institute; institutes are offered in the summer and academic year. The goal of this program is to develop a relationship between UCLA, community colleges, and middle and high school faculty that leads to the creation of two cross-curricular, multilevel modules that focus on environmental science. The modules span middle school through first year in college in content and are being disseminated throughout the Los Angeles basin. The project is aligned with the NSF-supported California's *Statewide Systemic Initiative* and *Scope, Sequence & Coordination* projects. The cost-sharing is 13 percent of the NSF award.



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Alliance of Mentors for Physics Instruction: A Teacher Leadership Institute

Award number:	9254454
Funding:	$1,983,774
PI:	John W. Jewett
Co-PI:	Roger Nanes
Institution:	California Poly Pomona Foundation, Inc., Pomona, CA
Dates:	April 15, 1993–September 30, 1996

This project is a collaboration between California State Polytechnic University–Pomona and California State University–Fullerton to enhance 42 experienced high school physics teachers in content and leadership skills. These teachers from the seven-county southern California metropolitan area serve as mentors for other teachers. This project focuses on integrating modern physics concepts throughout the classical high school curriculum. Three residential summer institutes, whose goal is content enhancement, feature lecture presentations, laboratory experiences, computer technology training (e.g., *Interactive Physics, Physics Explorer*), guest presentations, problem-solving sessions, leadership training, and the design of academic-year workshops and strand activities.

During these workshops, mentors disseminate content and strategies to additional physics teachers in two areas: (1) modern physics workshops, designed for experienced physics teachers and aimed at incorporating modern physics into the high school curriculum, and (2) conceptual physics workshops, designed for junior high school teachers, new high school teachers, and crossover teachers, and focusing on fundamental concepts in physics. In addition, each mentor is responsible for pursuing professional development activities in one of three "strands": (1) elementary in-service strand: improve the abilities of elementary school teachers to teach physical science; (2) research strand: establish and implement an educational research project at their local site; or (3) *scope, sequence, and coordination* (*SS&C*) in-service strand: work with California *SS&C* representatives to assist teachers in teaching integrated science.

All high school physics teachers in southern California are invited to attend topical conferences each year at which research scientists share information about applications of physics in the research world. Project mentors hold meetings during the conferences to share information and maintain networking relationships. These networking relationships are enhanced through a link to CSUNET, an existing computer network that links the California State University campuses.

The mentors' strand activities form the basis of a thesis project. After completing the program, mentors in the alliance are eligible for a Master of Arts in Teaching Science degree, using their thesis projects in conjunction with content enhancement from the summer institutes and a series of science education courses offered along with the summer institutes. This project works with the California Science Implementation Network, which is associated with the NSF-supported California *State Systemic Initiative*. Cost-sharing equals 29 percent of the NSF award.

Teacher Enhancement

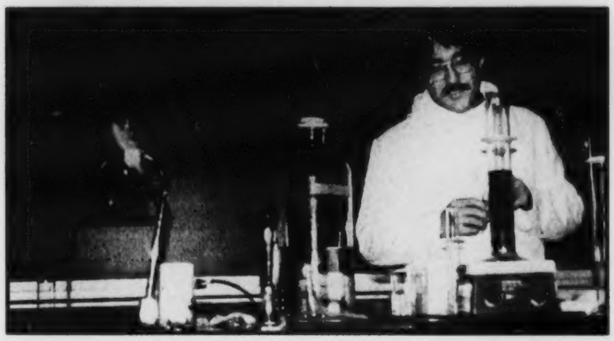
Award number:	9253340
Funding:	$1,072,756
PI:	Ralph Kanning
Co-PIs:	Jaime Escalante, David Hendry, Patty Van Hooser
Institution:	Foundation for Advancements in Science and Education, Los Angeles, CA
Dates:	April 1, 1993–September 30, 1995

The Foundation for Advancements in Science and Education in partnership with the Department of Energy, ARCO, and IBM is offering a professional development project for secondary mathematics teachers. This project is designed to help teachers motivate students' interest in mathematics through effective classroom use of the NSF-funded PBS Instructional Television series *FUTURES, with Jaime Escalante* and the *Multimedia Math Project* (MMP). The project tests and evaluates workshops for teachers to enhance the effective classroom use of both *FUTURES* and *MMP*, develops workshop facilitator kits, and produces a multimedia (laser disk and supporting print material) presentation which provides teachers with exemplary examples of motivational teaching strategies. Cost-share is 35 percent of the NSF award.

Mathematics Teacher Institute (MTI)

Award number:	9355735
Funding:	$574,100
PI:	Eunice Krinsky
Co-PI:	Marvin Brown
Institution:	California State University–Dominguez Hills, Carson, CA
Dates:	June 1, 1994–November 30, 1997

This project is providing teacher enhancement to 50 area high school teachers in schools that receive students from the Renaissance Middle Grades Mathematics Project. Participants are involved for three summers, each with six school-year follow-up sessions. The first two summers include 4-week programs focusing on mathematics content, unifying curriculum themes, instructional strategies, and the use of technology in moving to a standards-based high school curriculum. The last summer session will be 1 week with a focus on designing a school plan and staff development activities and involvement of the building principal. Cost-sharing is 24 percent of the NSF award.



Math Matters

Award number:	9353427
Funding:	$5,401,883
PI:	Thomas Lester
Institution:	California State Department of Education, Sacramento, CA
Dates:	February 15, 1994–July 31, 1998

The California Department of Education and a network of universities, in collaboration with the mathematics, compensatory, and migrant education organizations in California, are enhancing the mathematics instructional effectiveness of elementary educators to foster systemic schoolwide change in targeted schools. Two thousand teachers, administrators, and paraprofessionals are being enhanced in 100 K–6 elementary schools, where the student population is predominantly compensatory education and migrant students.

The project uses a teachers-teaching-teachers model starting with the selection and intense preparation of five teacher consultants. The consultants work with the project staff to enhance their skills and prepare regional training programs for 25 regional cluster leaders. Consultants and cluster leaders provide professional development focusing on strengthening mathematical knowledge and instructional expertise to the project participants. Follow-up sessions focus on modeling research-based instructional methodology, promoting teacher reflection using case studies, teaching replacement units, and phasing in schoolwide in-service activities. Project activities are based on participant evaluations and the local school requests. The project's effectiveness is measured by comparing student outcomes on the standardized California Assessment Program for grades 3 and 6 with student performance at comparable schools in the targeted counties. This project is in alignment with the NSF-supported California's *State Systemic Initiative*.

Making Science Real

Award number:	9254587
Funding:	$488,895
PI:	Yvonne Lux
Institution:	Poway Unified School District, Poway, CA
Dates:	January 1, 1994–June 30, 1997

The Poway Unified Schools District in partnership with local businesses and universities is designing an interdisciplinary project to improve, broaden, and deepen the scientific, pedagogical, and technological knowledge and skills of the participating teachers. This project, designed by Poway middle school teachers, is enhancing their ability to teach all students more effectively. Forty-eight Poway Schools involving grades 6–8 teachers of science, mathematics, social science, and language arts are (1) designing 12 thematic curriculum units that integrate state-of-the-art technologies as tools for learning that contribute to the acquisition of scientific literacy and (2) designing a site-based staff-development process model led by teachers with a focus on teaching and learning strategies and authentic assessment. District-level directors are active participants in the project.

Jaime Escalante Math and Science Program

Award number:	9155383
Funding:	$558,441
PI:	George Madrid
Institution:	East Los Angeles College, Monterey Park, CA
Dates:	August 1, 1992–January 31, 1996

This program increases the number of students who are at and above grade level in mathematics and science and prepares inner-city, underrepresented students for Advanced Placement Tests in calculus, computer science, chemistry, English, and physics. The program develops a formal process to bring together teachers, counselors, and staff from junior high schools, high schools, community colleges, and 4-year colleges to improve course articulation and to address more effectively the unique needs of the target population. A leadership component ensures that the project is disseminated to other schools in the Los Angeles area.

The California Earth Science Academy

Award number:	9254621
Funding:	$1,196,723
PI:	Ellen P. Metzger
Co-PIs:	Deborah R. Harden, Richard L. Sedlock
Institution:	San Jose State University, San Jose, CA
Dates:	April 1, 1993–August 31, 1996

The California Earth Science Academy (CESA) provides a comprehensive training program in earth science concepts and instructional strategies for teachers of grades 4–12. Four-week summer workshops enroll 36 and 30 teachers at San Jose State University and California State University–San Bernardino, respectively. Teachers are selected from the counties around these two sites. Graduate credits earned in the program are an integral part of a Master of Arts degree in natural science/geoscience. Thirty teachers, selected from previous summer workshops are leader teachers and offer workshops to peers far removed from any California State University campus. The summer workshops emphasize earth science content and pedagogy along with field trips and hands-on activities. Academic-year follow-up includes short workshops, classroom support, field trips, and communications via CESA-NET. Leader teachers take an active role in the second summer's activities after participating in leadership activities the first summer. The leader teachers conduct workshops for their peers supported by CESA project minigrants and LEAs. Cost-sharing equals 14 percent of the NSF award.

Microcomputer-Based Laboratory Tools for High School Physics

Award number:	9355508
Funding:	$399,034
PI:	Carl J. Naegele
Co-PI:	Clifton Albergotti
Institution:	University of San Francisco, San Francisco, CA
Dates:	June 1, 1994–May 31, 1997

This project introduces high school physics teachers to recently developed strategies for enhancing learning through the creative use of computers, high-tech sensors, and real-time data. Two groups of 24 physics teachers, selected from the San Francisco Bay Area schools, take part in a two-summer, 6-week teacher enhancement program with ten 1-day workshops in two academic years. Participants have the opportunity to fabricate some equipment of their own design based on their curriculum needs. During the academic year, special workshops for participants are conducted by faculty from nationally recognized microcomputer-based laboratory facilities. Each participant receives a variety of teaching materials and $400 in interfacing equipment for use in their respective schools. Participants may earn 16 units of academic credit.

Institutionalizing Student Biology Research Projects

Award number:	9153981
Funding:	$433,100
PI:	Steven Oppenheimer
Institution:	California State University–Northridge, Acampo, CA
Dates:	May 1, 1992–October 31, 1997

This project provides workshops to 40 middle and high school biology teachers primarily from schools with over 75 percent enrollment of underrepresented students. Sessions begin during the academic year and continue into a summer, week-long session. During the workshops, teachers are updated in current advances in biological science and are provided with cost-effective, hands-on, investigative activities that convey state-of-the-art concepts for use by all students and are easy to implement. Teachers and their students may be invited to participate in university research laboratories in the Center for Cancer and Developmental Biology. Project dissemination occurs through required in-service workshops, distribution of project products locally and nationally, through school curriculum guides, and through publication in national science teaching journals. Cost-sharing is 73 percent of the NSF award.

Language and Mathematics Project (LAMP)

Award number:	9155202
Funding:	$672,077
PI:	David Pagni
Institution:	California State University–Fullerton Foundation, Fullerton, CA
Dates:	August 1, 1992–January 31, 1996

California State University–Fullerton in partnership with Santa Ana Unified School District is offering professional development workshops for 64 K–5 teachers. The goals of the project are to help teachers improve their skills in mathematics and mathematics teaching and to support success of ethnic minority and Limited English Proficiency children in mathematics by focusing on using the language of mathematics in problem solving, on new content, and on higher order reasoning. One half of the participants are from Lowell Elementary, which has one of the highest minority enrollments and lowest mathematics achievement scores in the district. Participants attend 25 4-hour sessions throughout the school year and receive in-school support between sessions by specialists and peers who have been involved in previous programs in the district. Cost-sharing is 71 percent of the NSF award.

Hands-On Physical Science Workshops for Elementary Teachers

Award number:	9155182
Funding:	$482,945
PI:	Donald R. Paulson
Co-PI:	Linda Poore
Institution:	California State Los Angeles University Auxiliary Services, Inc., Los Angeles, CA
Dates:	May 15, 1992–October 31, 1995

This project provides six 3-week workshops for enhancement of 150 elementary teachers to become science mentor specialists for 75 Los Angeles area elementary schools. The workshops provide the mentor teachers with lesson plans and instruction for the hands-on physical science material kits that are used during in-services for colleagues. Two support sessions for all mentor teachers occur during the academic year following the workshop. Cost-sharing is 30 percent of the NSF award.

A Center for Teacher Enhancement Coordinated with Districtwide Reform

Award number:	9453935
Funding:	$5,998,930
PI:	Jerome Pine
Co-PIs:	James M. Bower, Jennifer Yure, Vera Vignes
Institution:	California Institute of Technology, Pasadena, CA
Dates:	October 1, 1994–September 30, 1995

The California Institute of Technology in partnership with the Pasadena Unified School District has brought together scientists, researchers, and engineers to work together with the school districts of California on science education reform. This teacher enhancement center is based on a previous NSF-funded project titled *Hands-On Science in Pasadena: Changing a Large School System*, which focused primarily on teacher education through guidance in inquiry-based instruction and the use of hands-on science curriculum materials. The project succeeded in reaching 10,000 elementary school children in 21 schools; 80 percent of the students were minorities. The creation of a center provides support and guidance to other school districts and their partners to implement similar change.

Replicating the success in Pasadena, the center is expanding this model to 14 urban school districts (97 schools) throughout California. The center's responsibilities are twofold: (1) professional development for teachers and (2) reform of the curriculum of participating school districts. The center offers intensive training to ensure that teachers are trained in hands-on inquiry teaching, leadership skills, curriculum evaluation and assessment. Participating districts work closely with the center to develop a core curriculum that best suits the district's needs. The curriculum kit modules produced are based on units taken from NSF-supported *EDC-Insights*, *FOSS* and *STC*. Each school district demonstrates its commitment to the reform effort by using their own resources to purchase and refurbish the instructional materials used in the classroom. The center affects 850 teachers directly and 4,000 teachers indirectly thus reaching 500,000 students. Cost-sharing is 24 percent of the NSF award.

Integrating Science and Mathematics Teaching for the Middle School Underrepresented Student

Award number:	9154824
Funding:	$555,571
PI:	Jack Price
Co-PI:	Barbara A. Burke
Institution:	California Poly Pomona Foundation, Inc., Pomona, CA
Dates:	May 15, 1992–August 31, 1995

This project is focusing on hands-on, integrated, real-life instructional activities for two-member teams (one mathematics and one science teacher) from each of 18 middle/junior high schools in eastern Los Angeles County having high minority populations. A 4-week summer workshop integrates topics in the physical, life, and earth sciences as well as mathematics under themes such as The Environment, Consumer Decision-Making, and Spaceship Earth. During the workshop, the teachers experience—as students—active, learner-centered involvement in their own learning. Project staff includes district middle school teachers and supervisors as well as university science, mathematics, and engineering faculty experienced in school in-service content and pedagogy activities. The summer experience then serves as a model of instructional strategies and content for the teachers to use in their own classes during the ensuing year. Monthly classroom visits and phone consultation between the participants and institute staff provide reinforcement and support for developing classrooms in which a positive attitude toward science and mathematics results in proportionately higher enrollment in those advanced courses after middle school. Three 1-day conferences of all participants are held each school year to evaluate the project. Cost-sharing is 26 percent of the NSF award.

Coordinated Science in California

Award number:	9355607
Funding:	$634,285
PI:	Thomas P. Sachse
Co-PI:	Fred Wood
Institution:	Far West Lab Education Resources and Development, San Francisco, CA
Dates:	July 15, 1994–December 31, 1995

Eighty teachers throughout California will continue implementation of coordinated science in grades 10–12. Teachers will be selected from a pool of 40 *Scope, Sequence and Coordination (SS&C) Project* schools which have received University of California Office of the President approval of their *SS&C* courses for college preparatory coursework. Teams of two teachers participate in 2-week institutes at either Southern California University–Sacramento or University of California–San Diego. The 2-week summer institutes are complemented by eight Saturday workshops during the academic year. An additional 200 teachers and administrators participate in linkage activity workshops in the summer and throughout the academic year. For example, one administrator, two grade 11 teachers, and two grade 12 teachers from the participating grade 10 teacher's school attend. All teachers are also linked through CSUNET electronic mail. A comprehensive evaluation plan uses the following: NSTA's *Guideline for Self-Assessment*, course content and instructional analysis adapted from an NSF study, the California–Golden State Exam, the California–Learning Assessment System, and a daily log to study science content and pedagogy used in the coordinated science classrooms. The goal of this evaluation is to compare student success in coordinated science (*SS&C*) with the traditional layer-cake curriculum.

Science and Technology Enhancement and Enrichment Project (STEEP)

Award number: 9254427
Funding: $991,484
PI: Paul Saltman
Institution: University of California–San Diego, San Diego, CA
Dates: March 15, 1994–February 29, 1996

The University of California–San Diego (UCSD) in collaboration with the San Diego Unified School District develops and tests an implementation strategy for bringing hands-on inquiry-based science to all of the city's elementary schools. This project enhances the science background and leadership skills of 400 K–6 teachers. The leadership training begins with a 3-week summer program for 2 years at UCSD. Leadership teachers provide support for their colleagues as they begin to teach the newly adopted instructional programs using the hands-on units. The cost-sharing is 32 percent of the NSF award.

C3—The Next Steps

Award number: 9155337
Funding: $768,763
PI: Harris S. Shultz
Co-PI: Edward Rodevich
Institution: Orange County Superintendent of Schools Office, Fullerton, CA
Dates: October 1, 1993–October 31, 1997

This project is conducting a school-based, staff development program for high school mathematics teachers in eight selected schools in Orange County. Four teachers selected from each of the eight schools participate in a summer program involving examination of new and innovative instructional materials, development of instructional units, use of the materials and units in a laboratory summer class of students who have completed grade 8, and collaboration with university mathematicians to understand more fully the mathematics concepts woven into the new curriculum. During the following school year, the teachers are given the time and support necessary for them to assume leadership in the incorporation of the new curriculum in their schools. In subsequent years, additional teachers from the targeted schools are brought into the program and preceding participants serve as mentors for the new participants. The goal of the project is to achieve full participation and significant change in the mathematics programs and teaching at each of the eight schools and to study the processes inherent in such change. Cost-share provided by the districts is 37 percent of the NSF award.

Summer Institutes for Teacher-Leaders in Global Systems Science

Award number: 9155393
Funding: $863,347
PI: Cary Sneider
Institution: University of California–Berkeley, Berkeley, CA
Dates: August 15, 1992–July 31, 1996

To address environmental problems in the educational sphere, the Lawrence Hall of Science is conducting a project consisting of five summer institutes. The institutes serve 125 teacher leaders who incorporate a "Global Systems Science" course into existing high school programs in their regions and assist in the education of their colleagues across the nation. The project begins by inviting 25 teachers to pilot test the "Global Systems Science" materials. These participants help shape the instructional materials and several of them return as staff members during the subsequent summer institutes. In total, four additional institutes last 3 weeks and accommodate 25 teacher leaders. The "Global Systems Science" course materials form the core curriculum. Participants in all five institutes visit laboratories and learn firsthand about the work of professionals who investigate such topics as global climate change, energy efficiency, and ozone depletion. These participants also receive instruction in how to assess learning and how to become leaders in their districts.

Reforming the Preparation and Professional Development of Elementary and Middle School Mathematics Teachers

Award number: 9354104
Funding: $751,309
PI: Judith Sowder
Institution: San Diego State University Foundation, San Diego, CA
Dates: July 1, 1994–November 30, 1997

This project is producing mathematics content course modules for use in teacher preparation and teacher enhancement for elementary and middle school teachers of mathematics. The project develops modules, including the use of CD-ROM technology, that focus on providing a deep understanding of the mathematics that the participants are expected to teach. Modules address number sense with whole and rational numbers, proportional reasoning, measuring, spatial sense and geometry, exploring data, chance, patterns and functions, and mathematical change. The materials are developed to provide course instructors the opportunity to model the types of instructional delivery expected of teachers in grades K–8 and will be available nationwide upon completion. The modules will be in software and CD-ROM format allowing instructor capability to modify to meet special needs. Cost-sharing by San Diego State University, school districts, and other local projects is 25 percent of the NSF award.

Orange County Science, Technology, and Society Network

Award number:	9353410
Funding:	$1,406,182
PI:	Mare Taagepera
Co-PIs:	George E. Miller, Thomas L. Anderson, Edward Rodevich
Institution:	University of California–Irvine, Irvine, CA
Dates:	January 1, 1994–December 31, 1998

This project proposes to establish an infrastructure in Orange County for the continuous infusion of interrelated science, technology, and societal issues into the secondary curriculum. A partnership of technically based corporations with both postsecondary and K–12 schools blends the expertise of educators with the scientific, technical, and management skills of industry. The project works with 110 "Science/Technology/Society Fellows" or master teachers in a "Leadership Institute." It is estimated that the fellows influence 2,000 teachers and through them 200,000 students. This network encompasses over 20 corporations dealing with energy, aerospace, and biotechnology; the Orange County Department of Education; and 10 postsecondary institutions and all of the school districts in Orange County.

Irvine–McDonnell Douglas Science Partnership

Award number:	9155468
Funding:	$270,720
PI:	Dorothy J. Terman
Co-PI:	Robert J. Sirko
Institution:	Irvine Unified School District, Irvine, CA
Dates:	April 15, 1992–January 31, 1996

The Irvine Unified School District, in partnership with McDonnell Douglas Corporation, is improving the science literacy of youth in grades 4–8 through incorporating activities to increase the amount of science in the curriculum; integrating applications of science into other courses and areas of study; and involving, in particular, female students. Activities include the following among others: (1) after-school "Science Little League," (2) Saturday morning tours and lectures, (3) in-house tours, (4) guest speakers, (5) development of hands-on lessons, (6) a cable TV show, and (7) development of a project dissemination handbook.

COLORADO

Rocky Mountain Secondary Teacher Enhancement Initiative in Mathematics

Award number:	9355642
Funding:	$577,260
PI:	William Blubaugh
Co-PIs:	R.L. Diaz, William W. Bosch, Richard Grassl, Paula Potter
Institution:	University of Northern Colorado, Greeley, CO
Dates:	September 1, 1994–August 31, 1997

This project is developing a masters degree program at the University of Northern Colorado (UNC). Fifty secondary mathematics teachers (40 high school and 10 middle school) in the three-state area of Colorado, Wyoming, and New Mexico are participating in the project. The teachers receive (1) enhancement in advanced mathematics consistent with shifts in mathematics curriculum reform, (2) enhancement in the use of appropriate instructional and assessment strategies, and (3) preparation in leadership and staff development. An 8-week session is offered each summer where participants take two mathematics and two mathematics education courses. In addition, laboratory/colloquiums on leadership, staff development, and technology are being offered. All participants and staff will be connected through UNC's electronic mail system. During the school year, participants design and conduct follow-up sessions in conjunction with meetings in their state or region with project staff coordination. UNC plans to sustain a Master of Arts in Mathematics for Teachers centered on the courses established in this project. Cost-sharing is 20 percent of the NSF award.

Colorado Science Teacher Enhancement Program (CO-STEP)

Award number:	9155199
Funding:	$1,493,955
PI:	Donald E. Maxwell
Institution:	Biological Sciences Curriculum Study, Colorado Springs, CO
Dates:	June 1, 1992–November 30, 1996

The Biological Sciences Curriculum Study (BSCS) has established a Trainer-of-Trainers Center and a statewide network of six Teacher Development Centers (TDC) in Colorado. Each center will be a collaborative partnership involving a university, Cooperative Educational Services, a regional branch of the Colorado Alliance for Science, and several school districts. The project design, which is consistent with the Colorado plan for the NSF-supported *State Systemic Initiative*, has four major components: (1) the teacher development network, (2) the trainer-of-trainers program, (3) the master-teacher program, and (4) the school-based teacher development program. Project staff is building a network to provide teacher development and follow-up implementation support for 540 master teachers and at least 1,080 additional classroom teachers of grades 4–6 (48,600 students). Four staff members from each of the six regional Teacher Development Centers (the center director, the project evaluator, a master teacher, and an administrator) are trained at the Trainer-of-Trainers Center. The six teams develop and implement plans for the improvement of science education through the regional TDC in their respective regions. Each TDC offers a series of courses on science and science teaching for the master teachers from its region. The master teachers are involved in an intensive, long-term program to improve their own science teaching and that of their colleagues. Teacher development networks provide follow-up support to the master teachers as they implement improvements in their science curriculums and instruction. Cost-sharing is 163 percent of the NSF award.

Teacher Development Modules for Elementary School Science

Award number:	9253321
Funding:	$1,065,053
PI:	Nancy M. Landes
Co-PI:	Janet Carlson Powell
Institution:	Biological Sciences Curriculum Study, Colorado Springs, CO
Dates:	February 15, 1993–July 31, 1996

This project is developing four modules to enhance the teaching of elementary school science. The materials, which include a set of learning guides and interactive videodisks, present the theory and rationale of the project and models of innovative approaches to curriculum and instruction. The modules focus on innovative instruction (constructivism, cooperative learning, and learning styles), curriculum emphases (thematic and *STS*), equitable teaching, and alternative assessment. The modules also incorporate the nature of science and technology, major science concepts, classroom management, educational technology, and the interrelationship of science and mathematics. Cost-sharing is 20 percent of the amount requested from NSF.

Leadership Training Program for Secondary School Teachers in the History and Nature of Science and Technology

Award number: 9155420
Funding: $959,974
PI: James R. Giese
Co-PIs: Janet Carlson Powell, Lynn Parisi
Institution: Social Science Education Consortium, Inc., Boulder, CO
Dates: September 1, 1992–August 31, 1995

This project is implementing a curriculum, based on the history and nature of science and technology (HNST), in selected school districts throughout the nation. The project has three stages. During the first stage, a teacher education resource book based on the HNST curriculum will be developed. The second stage is an intensive summer program for 40 teachers consisting of teams of teachers from the selected school districts. The summer programs include content and pedagogy enhancement as well as preparation for the implementation of the curriculum. The third stage of the project consists of follow-up activities in the districts, development of in-service plans, and implementation of the new curriculum in each district with the help of the resources of SSEC and the Biological Sciences Curriculum Study. Cost-sharing is 46 percent of the NSF award.

AISES Math/Science Teacher Enhancement Project

Award number: 9254429
Funding: $613,751
PI: John Hoover
Co-PI: Manert H. Kennedy, Deborah M. Baldridge
Institution: American Indian Science and Engineering Society (AISES), Boulder, CO
Dates: June 1, 1993–November 30, 1996

The American Indian Science and Engineering Society (AISES) and the Colorado Alliance for Science are collaborating in the implementation of this project designed to address the mathematics and science needs of three Wisconsin and three Michigan school districts which have large (90–100 percent) Native American populations. Collaboration between elementary and secondary teachers is promoted; each local team consists of three elementary teachers, a Native American teacher's aide, and one high school teacher. The project, which includes an annual 3-week summer workshop, four in-services, a 2-day leadership seminar, and classroom observations and visits, addresses the stated and identified needs of teachers of Native American students as determined through several needs assessments conducted by AISES over the past 6 years. These needs include the need for hands-on strategies, increased content knowledge, more American Indian culture in teaching mathematics and science, and more training in cooperative and discovery learning strategies. Cost-sharing is 4 percent of the NSF award.

A Comprehensive Approach to Using Internet Resources to Enhance K–12 Education

Award number: 9253356
Funding: $427,590
PI: Kenneth J. Klingenstein
Co-PI: Elizabeth M. Black
Institution: University of Colorado–Boulder, Boulder, CO
Dates: December 1, 1992–May 31, 1996

This project is expanding the uses and support of the Internet throughout the Boulder Valley School District in Boulder, Colorado. By concentrating on horizontal infusion into three middle schools and vertical infusion onto one elementary, one middle, and one senior high school in a feeder pattern, the training and development is maximized. The teachers directly trained are the peer instructors. Ultimately, over 258 teachers and administrators, including all building principals, are trained and have access to the Internet. The project has three distinct stages. In the first, a core group of teachers becomes peer instructors who are trained in the use of the Internet, including electronic mail and file access. In the second stage, the network is being used as a practical way to induce students to learn a foreign language. In the third stage, connectivity and training are spread throughout the district. Curriculum development of lessons that employ the network is done and disseminated. Cost-sharing is 40 percent of the NSF award.

Colorado College—Integrated Science Teacher Enhancement Program (CC-ISTEP)

Award number: 9355581
Funding: $1,172,590
PI: Paul J. Kuerbis
Co-PI: Keith B. Kester
Institution: Colorado College, Colorado Springs, CO
Dates: June 1, 1994–May 31, 1998

CC-ISTEP is a comprehensive teacher enhancement effort that also supports a new graduate degree for teachers. The objectives of *CC-ISTEP* include the following: (1) bringing together Colorado College faculty and local educators to design theme-based institutes, (2) establishing a network of faculty and regional educators to support the improvement of science teaching and learning in K–8 settings, (3) improving the teacher-participants' understanding of science and use teacher development principles to ensure long-term changes in pedagogical skills, and (4) using *CC-ISTEP* as a model for teacher development at other colleges. Colorado College faculty and local educators plan and implement theme-based, 6-week summer institutes. Participants are Colorado (or adjacent state) K–8 teachers. Follow-up academic-year seminars support the implementation efforts of the teachers. Dissemination conferences, open to 10 national teams, are held in the third and fourth summers.

Chemistry and Physics Fundamentals for Pre-High School Teachers

Award number:	9353359
Funding:	$708,621
PI:	James O. Schreck
Co-PI:	Courtney Willis
Institution:	University of Northern Colorado, Greeley, CO
Dates:	September 1, 1993–February 28, 1998

Teachers of science in grades 6–9 are attending two 4-week summer workshops to gain an understanding of basic chemistry and physics concepts and then developing effective methods of teaching these concepts in an integrated manner. The workshops feature content presentations, discussions, laboratory activities, demonstrations, safety sessions, teaching practice, planning outreach sessions, and attention to the interrelationships between chemistry, physics, and technology. An emphasis is being placed on effective methods for concept-based teaching using the teaching/learning cycle, cooperative learning, and improved integration of middle school sciences with other sciences and mathematics. Specially prepared background briefs, featuring applications and extensions of the workshop presentations are being distributed to the teachers. In addition, the teachers get a chance to practice with a group of students in the University of Northern Colorado science camp during the summer. The cost-share is 11 percent of the NSF award.

Enhancing Middle School Science Through Community Service

Award number:	9155427
Funding:	$708,483
PI:	Ronald Schukar
Institution:	Social Science Education Consortium, Inc., Boulder, CO
Dates:	October 1, 1992–March 31, 1996

This project, sponsored by the Social Science Education Consortium in cooperation with the Science Discovery Program at the University of Colorado–Boulder, is implementing an interdisciplinary science and social studies program. The curriculum emphasizes the analysis of local community problems, presents an understanding of the science issues behind these problems, and encourages student development of community action projects to help solve them. In the first 2 years, teams from nine school districts, selected from Arizona, Colorado, and New Mexico, study science and social science content in a 4-week summer session. The teams consist of middle school science and social science teachers and school administrators. The teams carry out in-service projects to implement the program during the academic years following each summer session. In the third year, two resource books for teachers are prepared by the project staff. A life science curriculum and an earth science curriculum are included in the two books. The content is based in part on what was found to be successful in the program-implementation process. Matching funds from the consortium and the school districts are 29 percent of the NSF award.

S3TAR—Small Scale Science: Teachers as Researchers

Award number:	9155195
Funding:	$625,503
PI:	Fredrick M. Stein
Co-PIs:	Edward L. Waterman, Stephen Thompson
Institution:	Colorado State University, Fort Collins, CO
Dates:	April 15, 1992–September 30, 1996

This project offers an interdisciplinary science program to 40 middle school and junior high school teachers from various districts in Colorado. Each summer, these teachers are taught the fundamental concepts of biology, chemistry, geology, mathematics, and physics appropriate to the grade level using a content-intensive thematic approach. In the academic year following the summer program, the participants, with the help of project staff, work toward implementing the new curriculum in their schools. This is done by (1) incorporating the new modules into the everyday curriculum, (2) conducting whole-school projects, and (3) offering teacher-to-teacher workshops. When the project is complete, a cadre of teacher leaders will disseminate innovative instructional models for middle school interdisciplinary science. Cost-sharing is 52 percent of the NSF award.

The Pueblo Project

Award number:	9150234
Funding:	$402,139
PI:	Sallie A. Watkins
Co-PIs:	Marta J. Wallin, Stephen R. Wallin, Carole B. Ricotta, Joyce Anderson
Institution:	University of Southern Colorado, Pueblo, CO
Dates:	March 15, 1992–August 31, 1995

This project enhances the physical science instruction in grades K–5 in the Pueblo, Colorado, school district. One of the objectives of the project is to achieve an equal educational opportunity for every child. The Pueblo Public School District No. 60 is among the top 10 in the nation in the enrollment of Hispanic children. Seventy-two leader teachers participate in the following: (1) during the summer, a 1-week Equity Institute followed by a 3-week Physical Science Institute; (2) during the academic year, monthly half-day workshops to prepare for classroom use of kit materials; (3) during the following summer, a 1-day workshop with their principals to plan for the science in-service of all the teachers in their schools; and (4) during the second year of participation, the implementation of their school's science in-service plan. The equity component is modeled on the successful, NSF-funded *Project SEER: Science Education for Equity Reform* conducted in St. Louis, Missouri. Cost-sharing is 21 percent of the NSF award.

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CONNECTICUT

Water Learning Lab

Award number: 8950359
Funding: $151,738
PI: William F. Brown
Co-PIs: John Dixon, Rosemary Macionus, Carla M. Horwitz
Institution: Eli Whitney Museum, Inc., Hamden, CT
Dates: September 15, 1992–February 29, 1996

The South Central Connecticut Regional Water Authority, the Eli Whitney Museum, and the Calvin Hill Day Care Center are collaborating in their efforts to create a Water Learning Laboratory. These partners and teachers from 16 towns are designing and developing the laboratory to meet the curriculum needs of grades 1–5. The outdoor facility offers "hands-on" and "hands-in" experiences in the movement, power, measurement, purification, and distribution of water. It offers opportunities for group building projects such as canals, aqueducts, and an introduction to the tradition of engineering begun by Eli Whitney on this site. Thirty teachers are trained each year to encourage experience-directed learning in the classroom. The project identifies gifted natural mechanics who may not show their full talents in conventional classroom work.

Mathematics Technology Institute

Award number: 9253311
Funding: $718,518
PI: Daniel T. Dolan
Co-PIs: Leslie Paoletti, Robert J. Decker, Kathryn Watson
Institution: Wesleyan University, Helena, CT
Dates: February 15, 1993–July 31, 1996

The primary aim of this project is to help 60 high school mathematics teachers integrate technology (graphing calculators and computer software) into the grades 8–12 curriculum—while at the same time strengthening the teachers' content background and enriching their pedagogical repertory. Thirty teachers are chosen from across Connecticut. Urban areas with high concentrations of minority students are being especially targeted. The program consists of two sequential 4-week summer institutes in which the participating teachers study and explore applications of technology in the classroom. The applications of technology are being studied in the context of modern mathematical content and modern pedagogical techniques, e.g., cooperative learning groups. To help smooth the implementation and dissemination process, administrators from the participants' home schools or districts are involved in the first summer program. Groups of high school students are participating to test new lessons and units as they are developed. Project staff provides support for the teachers' visits, as well as two scheduled 2-day workshops. Teachers are expected to engage in significant staff development work in their buildings and/or districts, as well as offering extended workshops of 30–40 hours for fellow teachers. The project described above is repeated for a second group of 30 teachers. Cost-sharing is 68 percent of NSF award.

SMARTNET 2000: A Teacher Enhancement Program for Precollege Science and Mathematics Education

Award number: 9353465
Funding: $1,045,436
PI: Babu George
Co-PI: Bette J. Del Giorno
Institution: Sacred Heart University, Fairfield, CT
Dates: October 1, 1993–March 31, 1997

This project supports the efforts of the NSF-supported *Statewide Systemic Initiative* in Connecticut by providing minicourses and resources to teachers in the 67 local school districts. The project delivers short courses ranging from 2 to 14 hours each to teachers on topics identified by the needs assessment. Summer sessions are 1 or 2 weeks long. Academic-year institutes include topics such as "Early Childhood Math," "Marine Science Project: For Sea," and "Music and Science in the Classroom." Key to this project is that the local community or staff identifies its needs and receives support and help in those areas. Partners in this project include the university, all school districts, and the local community. In this project, 45 schools are connected via the Internet so they can reach mentors, share resources, and interact with their colleagues in conjunction with and after the workshops. Cost-sharing is 71 percent of the NSF award.

Project Search: Statewide Teacher Enhancement in Connecticut

Award number: 9353526
Funding: $1,494,857
PI: Hank Gruner
Co-PI: Alberto Mimo
Institution: Science Museum of Connecticut, West Hartford, CT
Dates: January 1, 1994–June 30, 1999

This project provides two teachers from each of the 136 Connecticut public high schools with 144 hours of content preparation, training, and support for a statewide institutionalization of a rigorous new curriculum in environmental field research. Through summertime teacher institutes, year-round workshops, and regular meetings with professional scientists, the 272 teachers are (1) learning new instructional techniques for fieldwork pedagogy; (2) increasing their knowledge of aquatic ecology, environmental chemistry, and scientific reporting; (3) learning to use new computer systems and environmental monitoring equipment; and (4) helping students produce formal reports that are used by public and private sector agencies to compile research data about water quality in Connecticut. The project is jointly managed by teacher educators at a regional science museum and the Connecticut Department of Environmental Protection and uses public and private sector expertise to enhance teacher skills in a new applied environmental field research curriculum. *Project Search* has important implications for long-term curricular change and the systemic improvement of statewide high school science education. Cost-sharing is 49 percent of the NSF award.

Resource and Training Network for Science Teachers in Urban Middle Schools of Connecticut

Award number: 9254574
Funding: $904,228
PI: Donald P. LaSalle
Co-PIs: Daniel T. Dolan, Sigmund Abeles
Institution: Talcott Mountain Science Center for Student Involvement, Avon, CT
Dates: April 1, 1993–September 30, 1996

This project focuses on 12 Connecticut urban priority districts with intensive teacher enhancement for middle schools. All participants are part of an earlier NSF-funded project, *CONNSTRUCT* and, thus, have devised plans for reforming science education within their areas. The project provides resource network specialists, summer workshops for leadership teams, regional and local workshops, 10 statewide interactive video conferences per year, and on-site mentors. The project builds on state initiatives and ongoing projects to improve science education in the state. Moreover, the project forges cooperative relationships among the schools and between each school and the broader community. An advisory board supports selected instructional units, many of which draw from other successful NSF projects such as *Operation Physics* and *EDC-Insights: A Hands-On Science Curriculum*, a 1-week summer workshop for the leadership team, regional workshops for teachers, and local workshops of 1–2 days catering to the local needs. Mentors and interactive TV broadcast to 10 regional sites support the process. Cost-sharing is 38 percent of the NSF award.

Field Science Institute for Teachers

Award number: 9355749
Funding: $117,160
PI: J. Gregory McHone
Co-PI: Barbara MacEachern
Institution: Wesleyan University, Middletown, CT
Dates: June 1, 1994–May 31, 1996

This project increases the basic knowledge of K–12 teachers in science topics appropriate for field study using classroom work and fieldwork at suitable localities. The project allows 40 teachers to participate in the Field Science Institute during each of the summer semesters at Wesleyan University's Graduate Liberal Studies Program. The institute is conducted as four concurrent academic courses and seminars during 4-week sessions in July of 1994 and July of 1995. The courses being offered are in subject areas of field botany, field geology, field zoology (ecology), and field archaeology, plus a seminar in curriculum design for all participants. Graduate credits can be applied toward a Master of Arts in Liberal Studies or a Certificate of Advanced Study, and school districts may also award CEU's. Cost-sharing is 50 percent of the NSF award.

Teachers, Technology, and Environmental Concerns: Formula for Real Science in the Elementary School

Award number: 9153833
Funding: $514,207
PI: Marilyn Schaffer
Institution: University of Hartford, West Hartford, CT
Dates: June 1, 1992–June 30, 1996

This project is building a science culture within participating schools from Hartford, Connecticut, and promoting environmental literacy. The project builds on previously funded NSF activities and provides continued and expanded support to 15 of the teachers who have previously participated. The current project extends the program to an additional 78 teachers over the next 3 years (for a total of 93 teachers). During the academic year, project staff work with teachers and their students in the schools. During the summer, teachers participate in a 3-week workshop. Team leaders are selected from among the participants to become resource persons and peer coaches in their home schools. They receive leadership training and extensive support from project staff. Computers and related technology, including telecommunications, are being used to create a Center for Environmental Science in each school. Cost-sharing is 9 percent of the NSF award.

The Connecticut Museum Collaborative for Science Education

Award number:	9353561
Funding:	$1,963,176
PI:	Albert Snow
Institution:	Discovery Museum, Bridgeport, CT
Dates:	October 1, 1993–March 31, 1997

This project serves 5,000 middle school teachers and their students throughout Connecticut. The central concept of the project is collaborating the efforts of the museums throughout the state to provide a bridge between science-rich institutions and the schools for teacher enhancement, curriculum improvement, and student enrichment. The project has been developed cooperatively by four of Connecticut's Science Museums and Centers: The Discovery Museum, The Maritime Center at Norwalk, Mystic Marinelife Aquarium, and Talcott Mountain Science Center.

The *Collaborative* seeks to enliven and enhance the teaching of science, mathematics, and technology by drawing upon the resources of Connecticut's science-rich institutions and related businesses and industry. The project provides direct services to a core group of 72 middle school teachers and their students in eight urban and suburban school districts. Teacher training, curriculum development, and networking activities are offered at the four participating museums and in the school classrooms. Larger numbers of teachers and their students are also being served through a planned series of interactive video teleconferences. A theme-based approach is followed in which the unifying theme of "Earth Resource Monitoring" serves to connect the activities at the four cooperating museums. Special program components involve the participation of business and industry through "Video Field Trips" and parents through a "Family Science" activity. The involvement of the Connecticut Academy for Education in Mathematics, Science, and Technology as a member of the "Connecticut Collaborative" provides a direct link for integration of project activities into Connecticut's NSF-funded *Statewide Systemic Initiative*.

Western Connecticut Middle Grades Math and Science Teacher Leadership Project

Award number:	9355538
Funding:	$677,396
PI:	Jane Tedder
Co-PIs:	Timothy V. Craine, Nanjudiah Sadanand, Alan Trotochaud, Gail Nordmoe
Institution:	Rescue, Inc., Litchfield, CT
Dates:	May 1, 1994–October 31, 1997

Rescue, Inc., in collaboration with the Central Connecticut State University and other university and business partners, is conducting a project for middle grades mathematics and science teachers. The program enhances the skills of 90 teachers in 10 urban, rural, and suburban areas. Another 900 K–12 teachers are being served in leadership activities given by these teachers. Twelve teachers who helped plan the project serve as the core of the first cadre of participants and assume increasing responsibility for project leadership. Project elements include (1) introducing participants to national mathematics and science standards projects and exemplary curricula; (2) enhancing participants' knowledge by doing mathematics and science through constructivist approaches, applying technology, and working with authentic assessment; (3) providing year-round site mentoring and professional development; (4) introducing strategies to increase the participation of females and minorities in science, engineering, and mathematics (*SEM*), and (5) assisting grade 5–8 mathematics and science teachers to introduce enhancement into the classroom. Contributing organizations are the State Department of Education, Project *CONNSTRUCT* (SSI), the Connecticut Business and Industry Association, and Sacred Heart University SMART Center. Cost-sharing is 74 percent of the NSF award.

DELAWARE

The Delaware Teacher Enhancement Partnership: A Model for Implementing the National Council of Teachers of Mathematics (NCTM) Standards

Award number:	9155307
Funding:	$1,107,555
PI:	Ronald H. Wenger
Co-PIs:	Clifford W. Sloyer, Beatriz D'Ambrosio, Kathleen Hollowell
Institution:	University of Delaware, Newark, DE
Dates:	April 1, 1992–February 29, 1996

This project enhances 230 mathematics teachers and administrators of grades 7–9 in making mathematical connections, in problem solving, and in reasoning and communicating about mathematics. The project is targeting eight of Delaware's 16 school districts. The focus of participants' mathematical experiences is situation-centered mathematics tasks conducted in a technologically rich learning environment. Teacher involvement is based on the teacher-as-learner and teacher-as-researcher models. Teacher participants attend at least two 3-week summer workshops, and administrators attend at least 1 day per summer of these workshops to understand the spirit of the models being used. The workshops' mathematics content include (1) combinatorics and probability; (2) functions and statistics; (3) geometry and discrete mathematics; (4) summarizing, organizing into NCTM Standards curricula for grades 7–9, and leadership training; and (5) leadership and dissemination. During the school year in each district, weekly 2-hour after-school meetings are held to train other teachers on new curricula. In addition, project staff visit schools twice per week, and every month they offer 3-hour workshops to extend and clarify material from the summer workshops. The project also includes a collaborative learning component for administrators during which they consider basic leadership tasks needed to facilitate change. Thorough dissemination of the program's features and implementation strategies for replicating the project will be undertaken in the remaining eight districts and the three vocational-technical districts in Delaware. The project is endorsed by the NSF-supported Delaware *State Systemic Initiatives Project 21.* University of Delaware and school district cost-sharing is 37 percent of the NSF award.

DISTRICT OF COLUMBIA

A National Teacher Enhancement/ Implementation and Evaluation Project for Grades 9–10 Scope, Sequence, and Coordination in Science

Award number: 9354085
Funding: $3,952,000
PI: Bill Aldridge
Institution: National Science Teachers Association, Washington, DC
Dates: March 15, 1994–August 31, 1997

This project is developing and evaluating a *Scope, Sequence, and Coordination (SS&C)* program at the high school level. Thirteen high schools from California, Iowa, Montana, New York, North Carolina, Texas, and Washington, DC, are participating in this project, along with suitably identified control classes that use traditional curricula. The 140 participating teachers attend an in-service workshop which presents the philosophical constructs of the *SS&C* science education reform and prepares them to use instructional materials that are congruent with the *SS&C* approach. The project focuses on (1) the natural sciences, i.e., biology, chemistry, earth sciences, and physics; (2) the specification and incorporation of the basic tenets of *SS&C* at all sites; (3) coordination of teaching the science subjects, designed so as to achieve integration of the sciences by students; and (4) answering important evaluation questions, regarding the efficacy of the *SS&C* approach, before embarking on widespread implementation. All sites will (1) follow the *SS&C* principles of providing every science subject every year, explicitly taking into account student's prior knowledge; (2) provide a sequence of content from concrete experiences and descriptive expression to abstract symbolism and quantitative expression; (3) revisit concepts, principles, and theories at successively higher levels of abstraction; and (4) coordinate learning in the four science subjects so as to interrelate basic concepts and principles. The project works closely with the National Science Education Standards Development process at the National Resource Counsel. The *SS&C Framework* for grades 9–12 is being revised to meet the requirements of those standards, while conforming to the tenets of *SS&C*. Materials are being prepared in the form of anthologies of appropriate readings and core laboratory experiments adapted from extant sources.

Institute for Teacher Educators at Science Museums

Award number: 9053557
Funding: $675,262
PI: Andrea Anderson
Co-PIs: Hubert M. Dyasi, Wayne E. Ransom
Institution: Association of Science-Technology Centers (ASTC), Washington, DC
Dates: August 1, 1990–July 31, 1995

This project enhances the knowledge and skills of teacher educators in science and technology centers and museums nationally. In turn, these teacher educators use what they learn to improve their own teaching of children and the in-service and professional development programs which they now offer to elementary school teachers. The program works extensively with 90 teacher educators in teams of two or three. Some of the country's most outstanding teacher educators and research scholars in the fields of learning, teacher education, and multicultural education are teaching the summer institutes. Through the networking capabilities of ASTC and regular yearly meetings, these science educators support each other as they plan and engage in local projects designed to improve the teaching of science at the elementary level. As a result of this program, as many as 9,000 classroom teachers may have access to high-quality professional development opportunities, which better equip them to implement inquiry-based science instruction. The cost-sharing is 55 percent of the NSF award.

Project SCORE

Award number: 9355589
Funding: $736,072
PI: W.L. Austin
Co-PI: Georgiana F. Aboko-Cole
Institution: Howard University, Washington, DC
Dates: June 15, 1994–November 30, 1998

Project SCORE (Science Concepts Organized Reinforced and Enhanced) is a project designed by teachers and university professionals to develop a long-term interactive support system for life sciences teachers in Prince George's County, Maryland. An interdisciplinary core of university science content teachers, government and private-industry scientists, and other educational professionals introduce teachers to the latest scientific information in the life sciences via hands-on laboratory experiences and learning resources (kits, modules, etc.). *Project SCORE* consists of three summer science institutes for 25 new mentor teachers who will mentor teachers in schools in Prince George's County. The mentor teachers and mentorees receive sustained support throughout the year by Howard University science content teachers and graduate students. Life science awareness workshops are also being conducted for parents and students.

Integrated Environmental Science and Technology Education for Middle Grade Teachers

Award number: 9355753
Funding: $1,285,226
PI: Jerry Bell
Institution: American Association for the Advancement of Science, Washington, DC
Dates: June 1, 1994–May 31, 1998

This project is a collaborative effort between the American Association for the Advancement of Science (AAAS) and George Mason University (GMU). Forty middle school teachers from the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia are being trained to implement integrated environmental science and technology education into their science curricula. Three-

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and four-member teams from the same school participate. These teams include a science teacher, a computer science or mathematics teacher, and a technology education teacher. During the program, each teacher team (1) increases its knowledge of environmental science, mathematics, computer technologies, and technology education, as well as pedagogical content; (2) adapts and develops units of study that link science content with appropriate teaching and assessment strategies; and (3) disseminates to other teachers the process for developing an integrated curriculum and team approach to teaching. Time is also devoted to solving the problems between scientist/engineer partners and school administrators. The comprehensive project evaluation is designed to determine the success of (1) the teachers and units adapted/developed in terms of student outcomes, (2) team concept transfers, and (3) teachers' training through the dissemination workshops with units developed by others.

Operation Chemistry: Phase II

Award number:	9353374
Funding:	$2,759,424
PI:	Ann Benbow
Co-PIs:	Paul B. Kelter, Diane W. Burnett
Institution:	American Chemical Society (ACS), Washington, DC
Dates:	November 1, 1993–April 30, 1997

Operation Chemistry is a national elementary and middle school teacher project directed by the American Chemical Society. In cooperation with the American Institute of Physics' *Operation Physics*, the University of Wisconsin–Oshkosh, and Purdue University, *Operation Chemistry* uses a training-of-trainers approach to prepare 36 teams of teacher educators from 36 sites across the country to conduct chemistry staff development workshops in their home regions. Each *Operation Chemistry* team consists of a college chemistry faculty member, a high school chemistry teacher, an elementary/middle school physical science specialist, and a representative from a local chemical industry experienced in working with pre-high school science education. The first 36 teams are trained for 2 weeks during the summer at the University of Wisconsin–Oshkosh, followed by 2 weeks at Purdue University. Six workshop books on the basics of chemistry are the focus of the 2-week training-of-trainer session at the University of Wisconsin–Oshkosh. The 36 *Operation Chemistry* teams are traveling to Purdue University to work with the six applied chemistry workshop books. During this latter 2 weeks, the teams are joined by their industrial team members. The teams then return to their local school districts to conduct a minimum of 72 contact hours of staff development workshops during the school year. The staff development at the local sites takes the form of in-service workshops for grades 4–8 teachers as well as longer term college-based courses. After the first year of training and academic-year implementation, *Operation Chemistry* teams seek their own funding for the continuation of their staff development programs from their states, local school districts, and local industry.

ICE Fundamentals Program for Minority Teachers and Teachers of Minority Students

Award number:	9155223
Funding:	$630,397
PI:	Diane M. Bunce
Co-PI:	John W. Moore
Institution:	Catholic University of America, Washington, DC
Dates:	March 15, 1992–August 31, 1995

This project provides a 2-year summer workshop for 50 less well-prepared teachers of chemistry from the Washington, DC, area. The project is targeting minority teachers or teachers of minority students. During the academic year, the implementation of the techniques learned in the summer are emphasized. The teachers study chemistry content, learning theory, and instructional strategies for learning chemistry concepts. Lecture, pedagogy, and laboratory activities are integrated throughout the project. In the laboratory component of the project, teachers learn about microchemistry techniques, computer-lab interfacing, demonstration activities, and instrumentation. Cost-sharing is 10 percent of the NSF award.

Summer Institute for Middle School and High School Teachers of the Deaf in Life and Environmental Sciences

Award number:	9353238
Funding:	$879,801
PI:	Jane Dillehay
Institution:	Gallaudet University, Washington, DC
Dates:	February 1, 1993–July 31, 1996

The teaching of life and environmental science to deaf middle school and high school students nationwide is the focus of this project. To accomplish this purpose, a 4-week institute is being held at Gallaudet University each summer for 82 middle and high school teachers of the deaf. The institute integrates the expertise and facilities of the university's science faculties, the Genetics Services Center, the Fish and Wildlife Service, and the Marine Science Consortium, of which Gallaudet University is a member. The institute concentrates on genetics, physiology, and environmental science with a major focus on hands-on laboratory and field experiences. Other topics to be covered include teaching critical thinking, career information, techniques to improve teaching, and the use of educational technology. Participants are provided with a series of take-home lesson plans and are expected to transfer relevant information and pedagogical skills to their peers. Participants are also linked with faculty, staff, and each other via a computer conferencing system. Cost-sharing equals 5 percent of the NSF award.

Independent Study in the Sciences and Humanities Fellowship Program

Award number: 9155399
Funding: $843,845
PI: A. Graham Down
Co-PI: Elsa M. Little
Institution: Council for Basic Education, Washington, DC
Dates: September 1, 1992–February 29, 1996

This project is providing 100 summer fellowships for outstanding middle school and high school teachers (grades 6–12). The fellows are responsible for carrying out individual summer research projects under the supervision of mentors from colleges and universities chosen by the fellows. The topics chosen must relate to the interconnectedness between the sciences and the humanities. After the summer study is over, each fellow prepares a report on the summer activities and works with a colleague in humanities to apply the results of the study in an appropriate way to the school curriculum. Cost-sharing is 106 percent of the NSF award.

KidSat Curriculum Development

Award number: 9454197
Funding: $52,755
PI: William Durden
Institution: National Aeronautics and Space Administration, Washington, DC
Dates: August 15, 1994–July 31, 1995

This project provides a framework through which youngsters can gather, organize, manipulate, visualize, link, and interact with information. It is a unique link between the creators of the hardware, scientific researchers, and educators who can see the adaptability of this material for the advancement of learning. This project takes data waiting on the "information highway" and provides practical learning context for its use by students. In this pilot project, three teachers are funded for 6 months. As a supplement to the *KidSat Curriculum Development Project*, this project combines the team's and the teachers' efforts to produce usable materials for teachers and, thus, provides a scientific context for data use by students. Cost-sharing is 27 percent of the NSF award.

The Interdisciplinary Study of Urbanism in Middle School

Award number: 9155398
Funding: $318,658
PI: Frances Haley
Co-PI: Keith D. Harries
Institution: National Council for the Social Studies, Washington, DC
Dates: May 1, 1992–October 31, 1995

This project is teaching 24 middle school teachers from Maryland and the District of Columbia the basic concepts of urbanism. The program content is based on the integrated study of urbanism-sociology, political science, geography, and economics. Using this interdisciplinary approach, teachers, under the guidance of project staff, develop, test, and compare hypotheses about urbanism through the in-depth study of selected cities. The results of these studies are being used to develop middle school classroom activities that illustrate the scientific method practiced in the social sciences. During the follow-up phase, teachers implement the interdisciplinary program in the schools. At the end of the project, a book of 50 effective lesson plans for teaching urbanism in the middle school and suggestions on how to use these in in-service activities will be produced. Cost-sharing is 47 percent of the NSF award.

Strengthening Underrepresented Minority Mathematics Achievement Through a Consortium of Middle School and High School Intervention Projects (SUMMAC)

Award number: 9154054
Funding: $702,943
PI: William Anthony Hawkins
Institution: Mathematical Association of America, Washington, DC
Dates: February 15, 1992–July 31, 1996

The Mathematical Association of America (MAA), through its project *SUMMA* (Strengthening Underrepresented Minority Mathematics Achievement) is developing a national consortium of mathematics-based intervention projects. Its aim is to strengthen the existing projects and increase the number of projects by at least 10 each year. The consortium provides networking opportunities for mathematicians, mathematics teachers, and mathematics educators. Activities include workshops to be held at regional section meetings, the training of undergraduate students as counselors, and dissemination of information through presentations at national meetings and a newsletter. In addition, a handbook on how to start and conduct an intervention project and a directory of existing projects are being produced and widely distributed. The consortium is expected to recruit 7,000 newly recruited minority students whose teachers are participants. The long-range goal is to increase the number of minority students reached by mathematics-based intervention projects in the year 2000 to more than 15,000.

American Astronomical Society Teacher Resource Agents (A-ASTRA)

Award number: 9353377
Funding: $1,669,527
PI: Mary K. Hemenway
Co-PI: Peter B. Boyce
Institution: American Astronomical Society, Washington, DC
Dates: February 1, 1994–July 31, 1997

The *A-ASTRA* project prepares teachers to be astronomy resource agents in their geographic regions following a 4-week summer institute. The objectives of the *A-ASTRA* project include (1) enhancing the teaching of astronomy in elementary and secondary schools, (2) providing astronomy workshops to elementary and secondary teachers using hands-on astronomy activities, (3) encouraging the professionalism of the participants, and (4) increasing interactions among professional astronomers, science educators, and elementary/secondary school teachers.

During the summers, 25 participants at each of three geographical diverse sites interact with the primary instructional staff of professional astronomers, astronomy educators, and master teachers. The institute uses instructional materials to model the teaching of hands-on astronomy concepts, offers instruction in workshop presentations skills, and provides astronomical research or educational experiences unique to each site. These activities may include presentations of current research topics by area astronomers, field trips, and various observing/research experiences. The sites are Loyola University of Chicago, Northern Arizona University, and the University of Maryland.

Each site has a leadership team consisting of the site director and two teachers from previous NSF astronomy programs. These teacher consultants share their experiences in presenting workshops and classroom applications of the materials. Concerns about identifying topics suitable for different ages and presenting workshops to teachers of various grade levels are addressed. Thematic instructional materials that relate concepts from several science fields (integrated science) to astronomy provide the core of the summer institute. An advisory board consists of the nine members of the American Astronomical Society (AAS) Education Advisory Board and two elementary/secondary teachers. The principal investigator is involved not only in program organization but also in the instruction phase at each site, especially in the methodology of workshops.

Following their participation, the teachers become associate members of the AAS and attend an AAS meeting in the following summer. At the meeting, they report on their own experiences, both in the classroom and in the peer-led workshops they presented. They attend sessions especially designed for them to learn about the latest research in astronomy and have the opportunity to exchange ideas with many astronomers at the meeting. The participating teachers present at least four workshops which are expected to attract 6,000 teachers of 180,000 children per year.

VINE Follow-Through: Developing Strategies and Materials for Promoting More Meaningful Classroom Follow-Up to Informal Hands-On Investigations

Award number:	9355551
Funding:	$412,688
PI:	Karen S. Hollweg
Co-PI:	Carole A. Kobota
Institution:	North American Association for Environmental Education, Washington, DC
Dates:	March 15, 1994–May 31, 1997

This project builds on the existing *VINE Project* where youngsters investigate ecological interactions occurring on their school grounds. *VINE Follow-Through* works with leadership teams in three cities to design and test a set of strategies for developing collaborative teams and leading professional development initiatives. The strategies are designed to enable teachers to follow up on *VINE* investigations in a manner that enables students to do more science and construct meaning from their experience. *VINE Follow-Through* documents those strategies and produces professional development materials that can be used to apply this model in additional settings. Finally, the project evaluates this model for building on informal science education experiences and promoting science education reform and assesses its potential for use in conjunction with informal science education experiences offered through science museums and other community-based institutions. Each city's team includes five experienced teachers, a district curriculum coordinator, a university science educator, an action research expert, and a *VINE* project coordinator. Cost-sharing is 26 percent of the NSF award.

National Elementary Science Leadership Initiative (NESLI)

Award number:	9153780
Funding:	$5,989,160
PI:	Douglas M. Lapp
Co-PI:	Gary E. Dwoskin
Institution:	National Academy of Sciences, Washington, DC
Dates:	August 1, 1991–July 31, 1996

The National Science Resources Center (NSRC) project engages educators and scientists in a concerted and sustained effort to improve the teaching of science in the nation's elementary schools and increase the access of all students to effective elementary science instruction. *NESLI* (1) develops a talent pool of educators and scientists who can lead reform efforts in their communities, (2) provides technical assistance to school districts throughout the country that are working to improve their elementary science teaching resources, and (3) stimulates policy and program changes in school districts, changes that lead to the introduction of high quality hands-on elementary science programs in school districts across the nation. Cost-sharing is 64 percent of the NSF award.

In-Service Institutes for Junior/Middle School Science Teachers with Presidential Awardees as Instructional Mentors

Award number:	9055488
Funding:	$1,205,676
PI:	Robert E. Lewis
Co-PIs:	Barbara Saigo, Clifford L. Schrader, Marily M. DeWall, Cheryl L. Mason
Institution:	National Science Teachers Association (NSTA), Washington, DC
Dates:	August 15, 1991–July 31, 1995

Teams of four Presidential Awardees (PA's) in Science Teaching work with a university professor in 3-week summer institutes for middle school teachers. Institutes are being held at various college or university sites around the country facilitated by a site coordinator, who is a professor of science, and a team of four PA's, who serve as instructors. Each PA team includes a chemistry, physics, biology, and earth science teacher.

Each institute accommodates 30 participants for a total of 360 middle level teachers in the project. The institute programs are structured to include content in science, teaching methodology, cooperative team building, and special lectures on leading-edge science topics. In addition, special sessions on leadership training, conducting peer-led workshops, reviewing curriculum materials, and securing funding are being held. An instructional syllabus and a site coordinator's handbook are being produced to provide program consistency at each site.

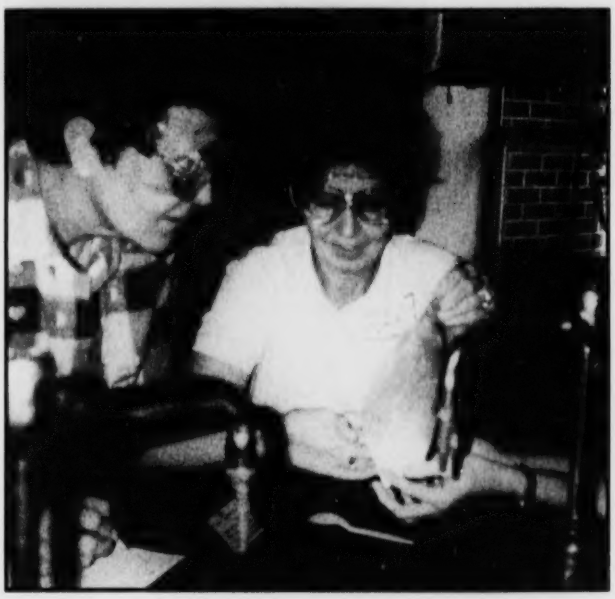
The aim of NSTA institutes is to obtain a mix of science teachers for different geographic areas and a variety of teaching circumstances to foster an exchange of experiences and viewpoints. Teachers are selected based on perceived need, leadership potential, and willingness to secure district funds for follow-up activities. At the workshops, participants prepare lesson plans based on content learned at the institutes. Compilations of the teaching materials are distributed to all participants, site coordinators, and members of APAST. In addition, all participants conduct at least one peer-led in-service workshop in their school districts or at an educational convention in the fall. Minigrants are available to participants who have completed and returned an in-service report form and have presented a rationale for the funds as well as an itemized budget and evidence of cost-sharing on the part of their school district. Cost-sharing equals 10 percent of the NSF award.

A Conference to Discuss the Mathematics and Science Teacher Preparation and Enhancement Programs at Predominantly Minority Institutions

Award number:	9450458
Funding:	$183,695
PI:	Shirley McBay
Institution:	Quality Education for Minorities Network, Washington, DC
Dates:	July 1, 1994–June 30, 1996

This project assesses the status of the mathematics and science teacher education programs at institutions whose population is composed predominantly of minorities. The project is determining what changes, if any, are required to ensure that future graduates and current teachers are able to provide quality mathematics and science instruction needed by today's students. The Quality Education for Minorities (QEM) Network is sponsoring a conference for 80 people consisting of Deans of the School of Education and Chairpersons of the Departments of Education, Mathematics, Biology, Chemistry, or Physics at 20 minority institutions.

Conference participants assess the status of the current mathematics and science teacher education programs at these institutions, discuss national teacher and mathematics and science curriculum standards and challenges in meeting them, learn about advanced instructional technologies, model strategies at participating institutions, and identify potential strategies and collaborations to ensure the production of graduates who can meet the standards expected. Conference proceedings are being produced and broadly disseminated. The audience for the conference proceedings is other predominantly minority colleges and universities with teacher education programs nationwide.



Leadership Training Institute in Dynamical Modeling

Award number:	9155204
Funding:	$255,698
PI:	James T. Sandefur
Co-PIs:	Joan Reinthaler, Rosalie Dance
Institution:	Georgetown University, Washington, DC
Dates:	July 15, 1992–December 31, 1996

This project in dynamical modeling is for 15 District of Columbia area high school teachers. The participants, who are assigned to three-member teams from each of four area school districts and one three-member team from the private schools, are selected according to their previous participation in an existing project in dynamical modeling at Georgetown University. The participants meet several times during the school year to further develop, implement, and monitor progress of results from the dynamical modeling project. They also attend a 2-week summer leadership training workshop to develop an in-depth in-service course to be team-taught to other teachers in their school system. Participants and principal investigators also attend a 1-week evaluation seminar and four follow-up seminars to monitor progress of the in-service courses. Cost-sharing by the university and the schools constitutes 27 percent of the NSF award.

Elementary Students Doing Science with Real Scientists

Award number: 9253067
Funding: $397,224
PI: Harold Sharlin
Institution: Emeritus Foundation, Washington, DC
Dates: August 15, 1992–February 29, 1996

This project makes a network of volunteer retired scientists, engineers, and mathematicians available to 700 elementary school teachers in the Washington, DC, schools. Building on an existing program, the project enables retired professionals to supplement science and mathematics offerings at the elementary level by working closely with teachers and students both in and out of the classroom. Activities include classroom hands-on demonstrations, field trips, mentoring, and workshops for both teachers and volunteers to design instructional activities and materials. In addition, manuals are being produced to assist with the training of new volunteers for the program. The project is designed as a model that can be replicated in other urban areas that have large populations of underrepresented students.

Carnegie Academy for Science Education

Award number: 9353462
Funding: $3,747,465
PI: Maxine F. Singer
Co-PIs: Ines L. Cifuentes, Charles C. James
Institution: Carnegie Institution of Washington, Washington, DC
Dates: December 15, 1993–May 31, 1999

This comprehensive project serves 450 elementary teachers in the District of Columbia Public Schools. Teachers are learning how to plan, develop, and use alternative forms of assessment. More teachers are served through mentor teacher activities. In the first year, 50 teachers from five schools participate; each year thereafter, 100 teachers from 10 different schools participate. During summer workshops, teachers train in the basic concepts of science, experience the best interactive activities, hear scientists share the excitement of doing science, and take field trips; they use computers for writing and organizing data, explore strategies for teaching and assessing students, and design an integrated science unit (covering about 6 weeks of study). Further support is provided through monthly workshops and on-site visits by project staff. Each year, 10 mentor teachers are selected from those who attended the previous year. The six areas for the summer institutes are earth, environment, life, materials, energy, and space. Scientists from local research institutions and Carnegie Institution of Washington, DC, are providing the science instruction, primarily through instructional dialogues. A "Users Group" links teachers and ideas of a speaker to the realities of the classroom. Materials from exemplary NSF-funded projects are being adapted to this project, e.g., *SS&C*, *Project 2061*, *CEPUP*, *FOSS*, and *DC Public School's Science/Mathematics Curriculum*. Upon completion of the training, teachers will earn college credits from Trinity College, Washington, DC.

Teacher Enhancement in Support of Higher Standards

Award number: 9355659
Funding: $1,957,244
PI: Arnold Strassenburg
Institution: National Science Teachers Association, Washington, DC
Dates: April 1, 1994–September 30, 1997

This national project is conducting a national survey of middle school teachers to assess their in-service needs on topics that comply with the emerging national science standards. The project also measures this model's effectiveness in generating local district support and in assessing whether local demand is sufficient. Each year 50 teachers at each site participate in a 4-week summer workshop led by an instructional team of a Presidential Awardee middle school teacher, a graduate student in the discipline or a closely allied discipline, and a university scientist in the topic area. The teachers from grades 6–9 participate in a workshop on effective science instruction. Content and hands-on activities are drawn from *The University Physics Project*, *SS&C*, and *The TRIAD*, NSF-awarded projects. If the project generates the local support anticipated and if local demand is sufficient so that local filling of the rosters contains the cost, then it is expected that this program will become a permanent feature of NSTA activities.

Travel Grants to the 13th International Conference on Chemical Education

Award number: 9450514
Funding: $50,000
PI: Sylvia A. Ware
Co-PI: Zafra M. Lerman
Institution: American Chemical Society (ACS), Washington, DC
Dates: May 15, 1994–October 31, 1995

This project supports the participation of 50 chemical educators at the 13th IUPAC International Conference on Chemical Education held in San Juan, Puerto Rico, August 8–12, 1994. Half of the educators are elementary, middle school, and secondary school science teachers and half are college faculty. The purposes of the project are threefold: (1) to use the international experience to enhance the leadership of the teachers within their own local, regional, and national networks; (2) to introduce teachers to issues of chemistry and science education in other countries, thus expanding their knowledge and classroom implementation options; and (3) to sensitize teachers to ways of teaching chemistry to different cultural groups, especially those of Hispanic and African ancestry. Participants attend two orientation workshops, one prior to and one during the conference. The workshops enhance their participation in the formal program and provide networking activities upon their return home. Networking activities include participation in an ACS-supported symposium, regional workshops and lectures, and articles in journals, newsletters, and teacher magazines. Another opportunity for teachers to enhance their international experience is to visit schools in Puerto Rico. Cost-sharing is 10 percent of the NSF award.

FLORIDA

InTech National Dissemination

Award number:	9254583
Funding:	$303,640
PI:	Judy Brown
Institution:	Miami Museum of Science Inc., Miami, FL
Dates:	May 1, 1993–October 31, 1995

Integrating Technology into the Elementary Mathematics and Science Curriculum (*InTech*) is an in-service program for elementary teachers developed by the Miami Museum of Science through support by the Florida Department of Education. *InTech* trains teachers to train other teachers in the classroom use of microcomputers, probes, databases, CD-ROMs, videodisks, and simulation software. To date, 200 teacher trainers from 27 Florida school districts have been trained using state funds. *InTech* plans to expand this training effort to a national audience. Four of the U.S. Department of Education's Regional Educational Research Laboratories (the NETWORK, North Central Laboratory, SERVE, and the Far West Laboratory) are acting as dissemination agents using the recently established Inter-Lab National Science and Mathematics Collaborative. One additional workshop module on telecommunications is being developed, thereby extending the *InTech* training workshop to a full week. Each regional laboratory hosts one workshop for states in that region. In total, 96 teacher trainers are trained in teams of four (science supervisors, university faculty, district coordinators for technology, representatives of state education associations) from 24 states (six per region). All participants are expected to conduct at least 9 days of training, and their employers must commit support for this in-service training in the application to the workshop. Creating a network of teacher trainers generates an ever-expanding pool of teachers capable of integrating technology into their classroom instruction. Cost-sharing represents 62 percent of the NSF award.

Program for Learning and Research in Science for Middle School Teachers

Award number:	9253170
Funding:	$886,820
PI:	Angelo Collins
Co-PI:	Penny J. Gilmer
Institution:	Florida State University, Manhattan, FL
Dates:	December 1, 1992–November 30, 1995

This project enhances the scientific skills of 72 middle school teachers in northern Florida and southern Georgia. The project is designed to help middle school teachers improve their knowledge and understanding of science. The project also aims to decrease the isolation of these teachers by increasing the communication between and among teachers and a university-based team. These needs are met through the following set of interrelated activities: (1) course work in science content and curriculum and instruction; (2) activities including seminar series on (a) the use of computers for research, communication, and instruction; (b) issues in science education, such as special needs of minority and female students, and current topics in science; and (c) leadership training; (3) research in both science and science education; (4) short and extended site visits; and (5) communication including electronic mail and meetings during the academic year. Teachers participating in the project meet the requirements for a master's degree in science education. Cost-sharing is equivalent to 30 percent of the NSF award.

Insect Field Biology for Middle School Teachers

Award number:	9155273
Funding:	$110,501
PI:	Donald Hall
Institution:	University of Florida, Gainesville, FL
Dates:	January 1, 1993–June 30, 1995

This project enhances the teaching of 44 middle school biology teachers, using field experiences that can be conducted within school grounds. Participants (22 per summer for two summers) attend a 3-week summer institute at the University of Florida. The subject content of the institute features the use of insect communities to study food webs, aquatic communities, territorial behavior, social behavior and caste systems, and the role of insects in pollination. Participants learn how to locate, observe, trap, and identify local insect communities. The major thrust of the program is on observation and hypothesis testing. Cost-sharing equals 58 percent of the NSF award.

An Industrial Partnership to Improve Mathematics and Science Education in Central Florida

Award number:	9155385
Funding:	$874,456
PI:	Michael Hynes
Institution:	University of Central Florida, Orlando, FL
Dates:	July 1, 1992–June 30, 1996

UCF/Martin Marietta Academy, a partnership between the University of Central Florida and Martin Marietta Corporation, is working toward improving mathematics and science education in K–8 public schools in three central Florida counties. Thirty teachers per year are participating in the academy. Teachers attend the equivalent of four semesters of courses, which include mathematics and science content, pedagogical aspects of teaching mathematics and science, and leadership training. Teachers are chosen in pairs from each target school. Follow-up activities include networking among the teachers in different schools and with the university faculty. Teachers receive credits toward a master's degree upon completion of the program. Each teacher in the program supervises and mentors an undergraduate education major. Active and retired scientists act as mentors in the schools. Cost-sharing is 84 percent of the NSF award.

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Technology, Discovery, and Communication in Secondary School Mathematics

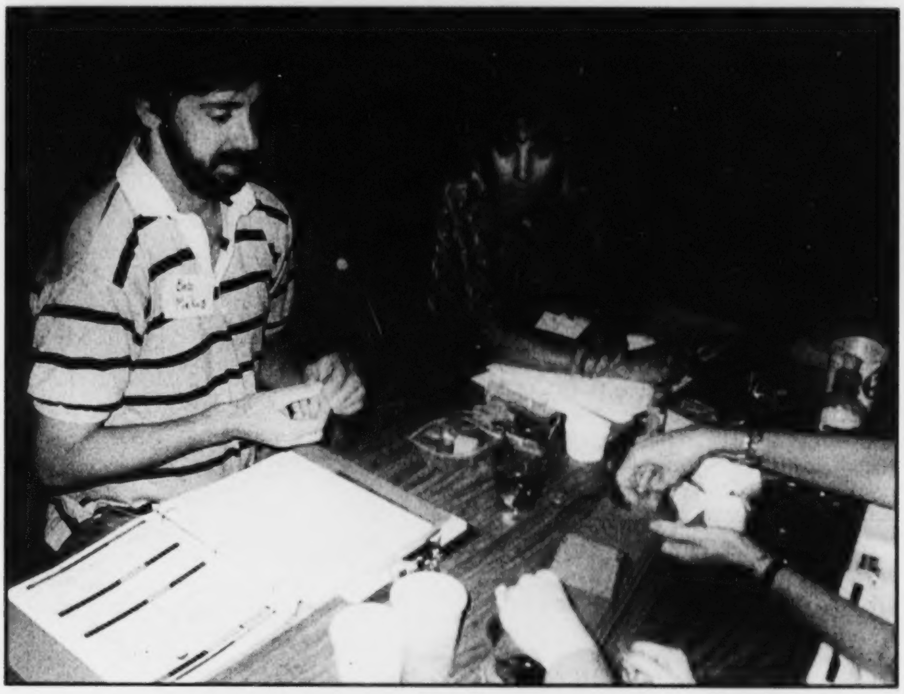
Award number:	9355567
Funding:	$277,939
PI:	Leonard Lipkin
Institution:	University of North Florida, Jacksonville, FL
Dates:	July 1, 1994–December 31, 1996

This project features a professional development program, reaching 52 in-service mathematics teachers and 8 graduate or undergraduate students in mathematics education at the University of North Florida. The program focuses on preparing the participants to introduce (1) classroom uses of computers and graphing calculators; (2) learning through discovery, problem solving, and group effort; and (3) writing as an essential part of the mathematics curriculum. Each program consists of a 4-week institute in the first summer focusing on algebra, precalculus, and calculus; monthly meetings during the school year to discuss classroom implementation of new lessons and teaching techniques, critique samples of student work; and an institute in the second summer focusing on general math, algebra I, and geometry. Three participants from the first-year program are selected to serve as adjunct instructors for the second program cycle. The 52 teachers participating in the program are expected to affect 200 additional teachers in their home schools and districts. The student participants are expected to use the experience as a basis for dissertations or research papers. Cost-sharing is 30 percent of the NSF award.

The Central and South Florida Middle School Partnership Program

Award number:	9355724
Funding:	$542,245
PI:	Thomas Marcinkowski
Institution:	Florida Institute of Technology, Melbourne, FL
Dates:	May 15, 1994–April 30, 1998

This project involves middle school teachers in the acquisition, implementation, and evaluation of carefully selected science content and *STS* issue instruction strategies in middle school classrooms. With the support of education service centers and participation from nine participating school districts in the central and south Florida region, project staff are training teams of key middle school teachers and supervisors in summer institute settings. Instruction includes science content, a wide range of regional *STS* issues, strategies for investigating and evaluating *STS* issues, issue resolution skills, and two well-researched strategies for teaching this content to middle school students. Subsequent to each institute, participants apply these skills and report their results. Over each school year, participants implement and evaluate much of this content in their classrooms, including one issue instruction strategy. As a part of the project's evaluation, the teachers report the results of their efforts to project staff and participants in a regular spring meeting. In the final year of the project, district teams participate in a summer seminar designed to prepare them to offer in-service sessions to their colleagues. Once trained cadres of teachers and articulated instructional programs are in place, extensive data can be collected to assess impact and program effectiveness. The cost-sharing is 42 percent of the NSF award.



GEORGIA

Leadership Resource Teams to Implement Interdisciplinary Middle School Science

Award number:	9353398
Funding:	$759,931
PI:	Wyatt W. Anderson
Co-PIs:	David P. Butts, Joseph S. Oliver
Institution:	University of Georgia, Athens, GA
Dates:	September 15, 1993–December 31, 1997

The University of Georgia is collaborating with the local NSF-supported *State Systemic Initiative* projects to enhance interdisciplinary science in the middle school by developing leadership resource teams (consisting of four master teachers, their science supervisor, and two college scientists) from nine school districts in the Southeast. These teams participate in three summer leadership institutes designed to build teachers' science knowledge base and teaching skills, while focusing on *Science, Technology, and Society (STS)* issues that are relevant to the teachers' local communities. These teams are also developing instructional modules linking concerns for *STS* to knowledge of the biological and physical world. Cost-sharing is 14 percent of the NSF award.

Leadership Infusion of Technology in Mathematics and Its Use in Society (LITMUS)

Award number:	8954793
Funding:	$1,440,161
PI:	Larry L. Hatfield
Co-PIs:	James E. Schultz, C. Henry Edwards, John Olive, Mary N. Atwater
Institution:	University of Georgia Research Foundation Inc., Athens, GA
Dates:	May 1, 1990–August 31, 1996

This project models collaborative strategy for infusing significant applications of modern technologies in the teaching of mathematics in grades K–12 in two northeast Georgia rural school systems. Forty-five selected mathematics teachers who serve as leader teachers (LT's) are working intensively with university mathematicians, scientists, mathematics and science educators, and master teachers. They are grouped by teaching level—grades K–4, 5–8, and 9–12—and must complete the following: specially designed mathematics and applied science content courses, teaching and curriculum implementation courses, a supervised internship, and two research seminars during two 6-week summer sessions and academic years. The mathematics content emphasizes real-life problems, with heavy emphasis on problems with science components. Based on their studies and the implementation experiences in their own classrooms, the LT's develop, with the help of the project staff, four in-service workshop packages for each of the teaching levels. These LT's work in teams and conduct the staff development workshops for their colleagues, called School Partners (SP's), and provide continuing classroom support for these SP's over the next 2 years of the project. Every teacher of mathematics for grades K–12 in these two districts is involved in this project as either an LT or an SP. Wherever possible, the LT works with teachers in his or her own school. Sufficient computers are provided to implement this project in a realistic and appropriate way. Content course syllabuses, grade-level teaching resources, in-service workshop packages, and descriptive and technical reports are being produced as a result of this project. The University of Georgia, Greene and Walton counties, Apple Computer Corporation, and the State of Georgia Eisenhower monies are sharing a large part of the cost of the total project, virtually matching the NSF award on a dollar-for-dollar basis.

HAWAII

Volcanology for Earth Science Teachers

Award number:	9353515
Funding:	$315,001
PI:	James L. Anderson
Co-PIs:	Robert W. Decker, Joseph B. Halbig, Janet L. Babb, Stephen R. Mattox
Institution:	University of Hawaii–Manoa, Hilo, HI
Dates:	March 1, 1994–February 28, 1997

This project is conducting a series of 3-week summer workshops for 25 teachers to be held at the Hilo campus. These workshops focus on the study of active volcanoes, and their objective is to improve middle and secondary earth science instruction by preparing participants to effectively teach their students about volcanoes and related geological processes and principles, such as plate tectonics and earthquakes. Science knowledge development, hands-on activities, interactions with scientists, field experiences, teaching strategies, and the development of teaching materials make up the core of the program. A resource book is being compiled and validated for each participant. The participants are expected to improve earth science curricula and classroom instruction upon returning to their schools.

Hands-On Science for Maui: Today's Children for Tomorrow's World

Award number:	9253304
Funding:	$389,291
PI:	Edward M. Boughton
Co-PI:	Ralph M. Murakami
Institution:	Maui Economic Development Board Inc., Kihei, HI
Dates:	February 1, 1993–July 31, 1997

The Maui Economic Development Board, in collaboration with the school district administration of Maui, Hawaii, has designed a project to revamp the teaching of science in the district's 17 elementary schools. Three-hundred-twenty teachers each receive 13 days of professional development, during which they become familiar with four hands-on, inquiry-based instructional kits for their grade level, as well as relevant teaching strategies and background content knowledge. A science materials resource center, established by a local company, is spun off as a small independent business. The Maui Chamber of Commerce, the Maui Economic Development Board, the California Institute of Technology, and local industry have committed financial support to the project, and local scientists have made a commitment of effort. The instructional material and teacher training model would be a duplicate of the successful NSF-funded *Project SEED (Science for Early Educational Development)*, a collaborative reform effort by the California Institute of Technology and the Pasadena Unified School District. The dissemination of *Project SEED* from Pasadena to Maui will implement a successful NSF-funded project in a community with genuine need. The effort replaces the district's current elementary science curriculum with an exemplary inquiry-driven, hands-on approach. Cost-sharing on this project represents 334 percent of the NSF award.

ILLINOIS

College Preparatory Mathematics Project

Award number: 9253326
Funding: $2,417,382
PI: John T. Baldwin
Co-PI: Roberta L. Dees
Institution: University of Illinois–Chicago, Chicago, IL
Dates: April 1, 1993–September 30, 1996

This project is twofold: (1) the continuation of teacher training at the University of Illinois–Chicago and (2) the beginning of teacher training at two other sites—the University of Wisconsin–Parkside and DePaul University. Training consists of intensive summer workshops on student-centered methods for teaching, such as using cooperative learning through innovative problem-solving and applications-oriented materials. The teachers gain experience using the materials by teaching groups of high school students taking summer courses. During the school year, each teacher implements the materials in a double-period class of first-year integrated high school mathematics for the same students who attended the summer course. Seminars during the school year provide further guidance for teachers, as well as in-class observation by project staff. In five high schools spread among the three centers, the Interactive Mathematics Project materials are implemented by the teachers supported by this project. A comprehensive evaluation plan is tracking student performance and retention of teachers involved in this project.

Partial Support for the Department of Energy National Teacher Enhancement Project (NTEP)

Award number: 9253358
Funding: $3,155,471
PI: Samuel P. Bowen
Co-PI: Marjorie G. Bardeen
Institution: Argonne National Laboratory, Argonne, IL
Dates: September 1, 1993–August 31, 1997

NTEP is a collaborative effort of the Department of Energy (DOE) national laboratories to improve science education in grades K–8. The project is designed to create cadres of lead teachers who serve as role models and mentors for their colleagues and who are considered district leaders in systemic reform initiatives. The laboratories optimize their impact on science and mathematics education by strengthening their growing collective efforts and by providing regional teachers with access to resources through the DOE national network. During this project, over 240 teachers receive direct training at the laboratories, and each of them conducts in-service programs for other teachers in their schools, thus having an impact on a large number of teachers nationally. This project is consistent with the National Science and Technology Council and other national efforts to coordinate, facilitate, and strengthen efforts to improve science education. Cost-sharing is 120 percent of the NSF award.

A Mentoring Network for Increasing Technology-based Mathematical Instruction

Award number: 9254579
Funding: $724,808
PI: Jon Johnson
Institution: Elmhurst College, Elmhurst, IL
Dates: August 1, 1993–January 31, 1997

The faculty of Elmhurst College, along with nine mathematics teachers from three Chicago metropolitan area high schools, are helping 60 faculty members and their administrators in nine participating high schools to apply technology to the mathematics curriculum through an ongoing mentor project. Mentor teachers are paired together and work with the faculty at three participating schools. The project involves (1) spring and summer workshops for mentor teachers and participating faculty; (2) continuing in-service and on-site visitations by the mentor teachers; (3) adaptation of new classroom materials; (4) exploration and development of teaching strategies that consider local faculty expertise, hardware and software, course offerings, current texts, and curriculum emphasis; and (5) the establishment of a resource center and library of technology-oriented teaching materials at Elmhurst College.

Developing Elementary and Middle School Mathematics Professionals

Award number: 9355541
Funding: $1,949,465
PI: Michael E. Koenig
Co-PI: Jerry P. Becker
Institution: Belleville Public Schools District #118, Belleville, IL
Dates: July 1, 1994–June 30, 1998

This project in mathematics is for 300 elementary and middle school teachers. All teachers in Belleville, Illinois, receive teacher enhancement during the first summer. Successive groups of teachers from surrounding districts receive enhancement in the following two summers. For each teacher, the program has a 4-week session the first summer and a 2-week session the following summer, with monthly full-day seminars during the intervening school year. Community involvement includes business leaders, parents, and district administrators. District teachers serve as leaders, along with external specialists, in carrying out the program.

Workshop Utilizing an Innovative Approach to the Teaching of Science in the Middle School Level

Award number: 9253266
Funding: $515,773
PI: Zafra M. Lerman
Institution: Columbia College, Chicago, IL
Dates: November 1, 1992–April 30, 1996

This project recruits middle school teachers from the Chicago area to participate in a month-long summer workshop that originates from Columbia College in Chicago, Illinois. The program extends previous work by Dr. Zafra Lerman from elementary schools into the middle schools, the primary objective being the enhancement of middle school teachers' content and pedagogical knowledge in science. The principal investigator and others are developing a curriculum that integrates science and mathematics. The interdisciplinary approach to the curriculum extends beyond the linkage of mathematics and science by integrating the physical, chemical, and biological sciences. Methods developed to excite science learning in teachers and students include the use of art, plays, music, and dance. These approaches also enable teachers to make connections across the curriculum for the students and illustrate the everyday context of science and mathematics. Cost-sharing is 27 percent of the NSF award.

Materials Technology Workshop for High School Science Teachers

Award number: 9253386
Funding: $466,096
PI: Jennifer A. Lewis
Co-PI: James B. Adams
Institution: University of Illinois–Urbana-Champaign, Urbana, IL
Dates: April 1, 1993–September 30, 1996

This project provides a 4-week workshop each year for 25 high school teachers. The workshops consist of lectures, demonstrations, and hands-on laboratories on topics in technology, such as solar cells, superconductors, and cement. Both university faculty and industry personnel conduct the workshops. The modules are tested on high schools after evaluation and modified if necessary. The modules considered to be the most successful are disseminated nationally. The matching funds from the schools and the university constitute about 17 percent of the NSF award.

Resource for Science Education (RSE): An Infrastructure for High Performance Computing and Communications in Education

Award number: 9353226
Funding: $504,134
PI: Robert M. Panoff
Co-PIs: Scott Lathrop, Lisa A. Bievenue
Institution: University of Illinois-Urbana-Champaign, Urbana, IL
Dates: January 15, 1994–June 30, 1996

This is a seed project established to accept visiting researchers at the National Center for Supercomputing Applications (NCSA). Educators in science and mathematics who have a commitment to hands-on education will be actively recruited. Research proposals are sent directly to the center and a visiting position is awarded once the proposals are reviewed by the advisory board and the staff find funding. The center is donating space and providing support for up to four visitors at any one time. The projects range from 15 to 90 days, and the participants are on sabbatical leave from their home schools or institutions. Follow-up support is integral to the projects and is provided. Future projects will vary in scope and discipline. Because of tools NCSA and others have developed, programming is not essential for participation. Cost-sharing is estimated at 28 percent of the NSF award.

Institute for Teacher Enhancement in Physics

Award number: 9253206
Funding: $474,730
PI: Thomas Rossing
Institution: Northern Illinois University, De Kalb, IL
Dates: June 1, 1993–November 30, 1995

Twenty teachers are participating in a 6–8 week summer institute in physics. Those participants who opt for the longer time have the opportunity to be involved in a research experience with the university faculty for 2 weeks. Six 2-day follow-up sessions are held during the academic year on the university campus. Electronic networking between the teachers is anticipated where feasible. Graduate credit is being offered to those who complete the entire program. The project is aimed mainly at teachers who majored in an area of science other than physics and who teach in smaller schools in rural areas in northern Illinois and southern Wisconsin. A few leader or master teachers are included to act as mentors for underprepared participants. A strong emphasis in the program is placed on the constructivist approach to teaching to reflect the results of current research in physics teaching. Demonstrations, laboratory experiments, field trips, and seminars broaden the spectrum of course offerings. Cost sharing is 43 percent of the NSF award.

Turning on the LITES—Leaders in Teaching Elementary Science

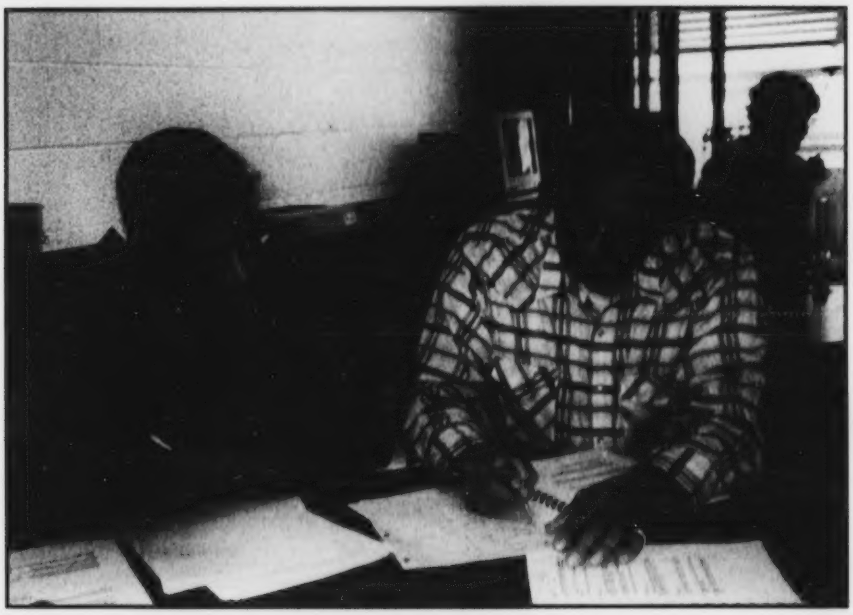
Award number:	9254414
Funding:	$658,481
PI:	David A. Winnett
Co-PIs:	Virginia R. Bryan, Michael A. Schneider
Institution:	Educational Service Center, Belleville, IL
Dates:	June 1, 1993–November 30, 1996

This project is enhancing elementary science teaching by combining efforts of teachers, administrators, and parents in 15 elementary schools. Resources are being provided by a local institution of higher learning, and the Educational Service Center is providing technical support. Project activities include 5 weeks of course work for leaders each summer and extensive implementation and follow-up activities during the school year. The *LITES* lead teachers are being trained to use several validated activity-based science curricula, select course options to improve their science knowledge, and develop leadership skills to assist other teachers in implementing activity-based science. School teams are composed of an administrator, a primary teacher, and an intermediate teacher. Schools with significant populations of minority students are given priority. Cost-sharing is 39 percent of the NSF award.

Formation of a Psychology Institute (PsyIns) to Provide High School Psychology Teachers with Interactive, Hands-On Lab Experiences to Teach Psychology as a Scientific Endeavor

Award number:	9253164
Funding:	$410,428
PI:	Fred L. Yaffe
Co-PI:	Eleanor E. Midkiff
Institution:	Eastern Illinois University, Charleston, IL
Dates:	June 1, 1993–November 30, 1996

This project provides a 4-week summer program to 25 teachers of high school psychology. The objective is to acquaint teachers with the use of hands-on modules in demonstrations and experiments, which illustrate the scientific aspects of psychology. Teachers learn about the modules, use them in the schools, and revise them as needed. The revised modules are evaluated by an outside evaluator or used with a group of less well-prepared teachers. The implementation and dissemination phase of the project follows. Matching funds from the school and the university are 14 percent of the NSF award.



INDIANA

Earth Processes Education Program for Teachers (Grades 5–9)

Award number:	9355721
Funding:	$726,091
PI:	Lawrence W. Braile
Co-PI:	Gerald H. Krockover
Institution:	Purdue University Research Foundation, West Lafayette, IN
Dates:	May 1, 1994–October 31, 1998

This project serves 90 earth science teachers from six midwestern states. Thirty teachers attend a 4-week intensive summer workshop, two weekend workshops during the academic year, and a 1-day workshop at a national NSTA meeting. The enhancement activities include the following: improving content knowledge of current concepts and application of earth processes, introducing skills through modern technology using computers, taking an extended field trip in the Midwest region, and practicing presentations and other hands-on experiences. The program has two parts: the teacher enhancement workshops in the summer and an academic-year follow-up. The central content theme of earth processes is complemented by activities that prepare teachers to disseminate their understanding of earth processes through the use of materials, activities, and modeling teaching skills at local in-service workshops and regional and national presentations. Participants are required to conduct at least one in-service workshop for their peers. This is facilitated by providing them with guided grant-writing experiences. Participants may earn six semester hours of course credit at Purdue University: three semester hours in the Department of Earth and Atmospheric Sciences and three semester hours in the Department of Curriculum and Instruction.

In-Service Program in Physical Geography: Introductory, Advanced and Outreach Models

Award number:	9253187
Funding:	$300,203
PI:	William A. Dando
Co-PIs:	Dorothy W. Drummond, John A. Harrington, Susan M. Berta
Institution:	Indiana State University, Terre Haute, IN
Dates:	January 15, 1993–June 30, 1995

This project offers 25 teachers a 3-week summer workshop covering meteorology, climatology, geotectonics, natural hazards, and applications in remote sensing. Teachers prepare teaching modules, implement the content in their classrooms, and carry out in-service activities in their districts. The project is being supported by the university and local school districts with cost-sharing equal to 75 percent of the NSF award.

Implementing the Standards on Mathematical Modeling

Award number:	9155189
Funding:	$651,586
PI:	Daniel P. Maki
Co-PIs:	Maynard Thompson, Frank K. Lester
Institution:	Indiana University–Bloomington, Bloomington, IN
Dates:	January 1, 1993–June 30, 1996

This project focuses on mathematical modeling for 90 high school mathematics teachers (30 each year). The project includes a 4-week summer institute with a focus on (1) developing basic ideas and tools for mathematical modeling and their use in various modeling projects and (2) developing classroom implementation plans and materials. Six teachers from a previous summer pilot project serve as participant leaders and mentors in the first institute; teachers from each of the summer institutes similarly serve in the subsequent institute. Follow-up activities include staff site visits and two follow-up meetings each year. Cost-sharing provided by the university and schools is 24 percent of the NSF award.

Purdue Instrument Van Project: A University/High School Collaboration for Enhancing Learning in the Laboratory

Award number:	9353408
Funding:	$1,527,220
PI:	Harry A. Morrison
Co-PI:	Diane W. Burnett
Institution:	Purdue University, West Lafayette, IN
Dates:	August 15, 1993–January 31, 1999

This project provides 120 secondary school biology and chemistry teachers from Indianapolis and rural districts in Indiana with workshop opportunities to gain content knowledge and skills in using modern laboratory instrumentation. In 3-week summer workshops, 10 two-person teams of a biology and chemistry teacher from the same district use analytical instrumentation common to both disciplines and design laboratory curriculum modules using the instrumentation in their classroom. The same teachers attend another 2-week workshop to learn new content and instrumentation and to resolve problems encountered in classroom use of the instrumentation. Teachers may earn nine credits for the first summer and six credits for the second. Support for the summer activities during the academic year is provided by a "Chemobile," a van equipped with the instrumentation the teachers have used. It delivers the instruments to local districts to support instruction in the teacher's classroom. Instrumentation in the van is provided by Purdue University. The van driver is a teacher qualified to use the instruments and provide appropriate on-site instructional support. Indianapolis schools are further served by a Purdue visitation team composed of a university faculty member and an industrial scientist. The project builds on an earlier pilot project that served a limited number of chemistry teachers.

Enhancing Teachers' Ability to Teach Mathematics as Communication

Award number: 9055479
Funding: $466,795
PI: Justin J. Price
Co-PI: Robert J. Bryant
Institution: Purdue University, West Lafayette, IN
Dates: July 1, 1991–June 30, 1995

This project enhances middle and high school mathematics teachers in teaching mathematics as communication. This is accomplished through 2-week summer workshops and monthly meetings during the school year. During the second summer, 10 of the original participants serve as teacher leaders to help enhance 35 new participants. During the third summer, 35 teachers from the first 2 years are invited back. There, teachers act as teacher researchers, developing suitable teaching and learning methods that are edited and disseminated. They also prepare to serve as teachers-teaching-teachers, conducting 35 half-day workshops for their colleagues. Sixty-five middle and high school teachers receive first-level enhancement, and 350 additional teachers should receive second-level enhancement through the half-day workshops. In all, 415 teachers and administrators are being enhanced. Mathematics as communication is one of the National Council of Teachers of Mathematics standards that needs further research, development, and implementation. This project should help accomplish these goals. Cost-sharing is 15 percent of the NSF award.

INtegrating LABoratory Instruction and Assessment (INLAB)

Award number: 9154840
Funding: $628,821
PI: Daniel Shepardson
Institution: Purdue University, West Lafayette, IN
Dates: June 1, 1992–May 31, 1996

This project provides a plan for improving the quality of laboratory instruction and assessment techniques in the middle school and developing leadership teams to in-service and mentor peers. The project initially involves 30 teachers who are receiving direct training throughout the duration of the project. After training, the 30 teachers conduct staff development programs to expose other teachers to the new curriculum developments. The teacher training method affects 30 teachers plus 300 peer-trained teachers for a total of 330 teachers. The training involves the teachers in three different types of laboratory activities: (1) confirmation laboratory activities, which deal with direct experience with materials designed to demonstrate or verify principles or concepts that have been previously discussed and are already part of the teachers' experience; (2) generalization laboratory activities, which provide teachers with a wide range of experiences that can be used to link direct experience with abstractions—concepts, principles, and theories; and (3) resolution laboratory activities, which engage teachers in problem-solving situations that require them to resolve problems in the laboratory. These three different types of laboratory experiences prepare teachers to sequence laboratory activities in their classrooms to help their students understand science conceptually. Cost-sharing is equivalent to 6 percent of the NSF award.

IOWA

Science, Parents, and Literature: The Science Pals Project

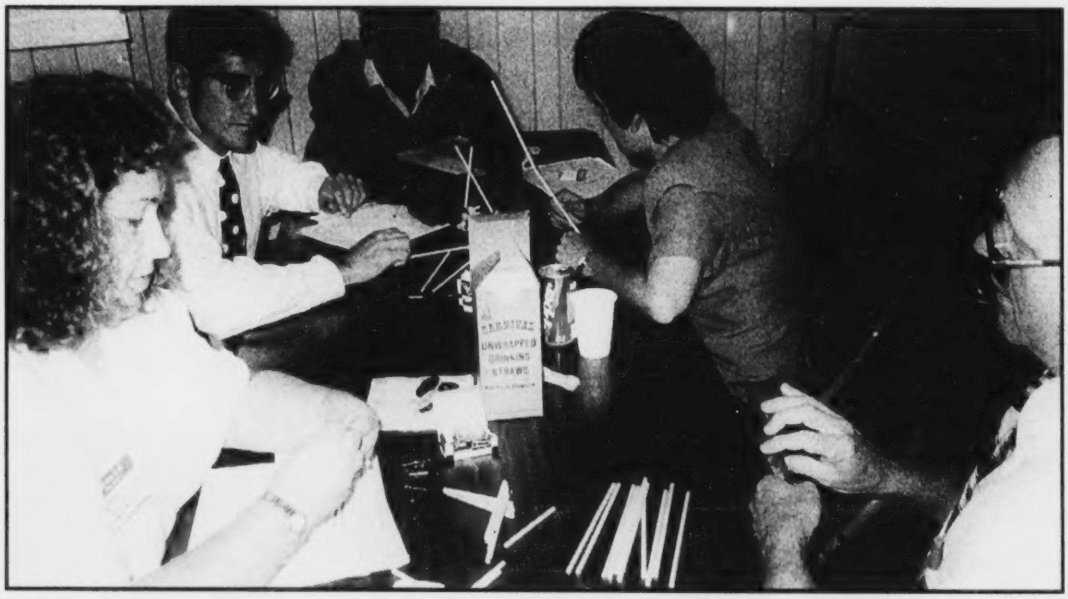
Award number:	9353690
Funding:	$1,011,875
PI:	James A. Shymansky
Co-PI:	John A. Dunkhase
Institution:	University of Iowa, Iowa City, IA
Dates:	January 15, 1994–June 30, 1999

This project is the result of a partnership between the University of Iowa and the Iowa City Community School District, which is committed to restructuring its science program. The plan enhances the development of all teachers, grades K–6, in the district by immersing them in in-service activities which require (1) analyzing the scientific basis of activities in the district's current science program, (2) examining potential supplemental or replacement materials, and (3) refining and revising their science programs to make science more meaningful to students. Through the summer component of the project, three lead science teachers for each of the city's elementary schools are identified and prepared to provide support and in-service opportunities for their colleagues. During the summer, the lead teachers have opportunities to expand their own science knowledge, develop insights into children's science reasoning, and improve their ability to use inquiry-based instructional strategies. During the school year, these lead teachers are given opportunities to mentor their colleagues as they implement the school system's inquiry-based science units. The Iowa City School District's stature as a leader in the Midwest enables this project to serve as a model for other sites in the Midwest and provide leadership teams for future dissemination efforts. The cost-sharing for the project is 50 percent of the NSF award.

Iowa Scope, Sequence, and Coordination (SS&C), Grades 6–10

Award number:	9355537
Funding:	$2,009,442
PI:	Robert E. Yager
Co-PI:	Paul E. Rider
Institution:	University of Iowa, Iowa City, IA
Dates:	May 1, 1994–October 31, 1997

At each of four sites (Mason City, Davenport, Chariton, and Creston), two satellite districts are being added to the *Iowa Scope, Sequence, and Coordination (SS&C)* project. The new sites provide statewide coverage and test the transportability of the Iowa *SS&C* model. Frameworks and approaches are being completed for grades 6–8, and work continues in grades 9–10. The teacher enhancement activities follow the Iowa Chautauqua in-service model: a 2-week leadership conference including teachers from each site and all grade levels; a 3-week summer workshop at each site for all teachers at a given grade level, with representative teachers from preceding and following grades; 2-day courses, each academic semester, for site leaders and other personnel; weekly meetings of teachers at specific grade levels in each participating school; and monthly 2-day in-service meetings involving all teachers at each site. In total, 120 teachers in grades 6–10 are enhanced over the life of the project. The cost-sharing support comes from local schools, intermediate school districts, the Iowa Utility Association, other industries, and the University of Iowa.



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KANSAS

Northeast Kansas Elementary School Mathematics Dissemination Project

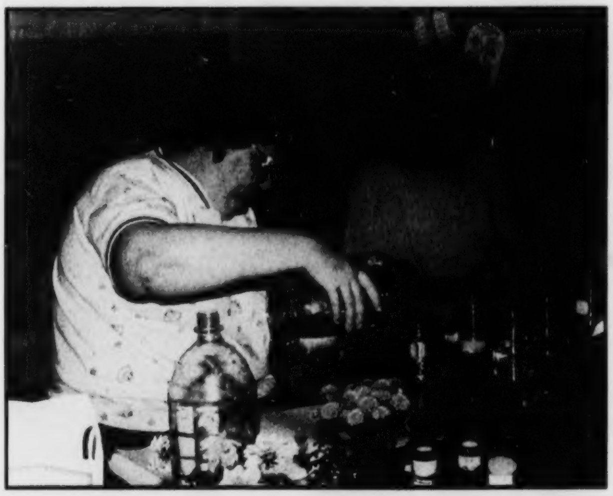
Award number:	9154845
Funding:	$496,893
PI:	Judith Roitman
Institution:	University of Kansas, Lawrence, KS
Dates:	April 15, 1992–September 30, 1995

The University of Kansas is offering a teacher enhancement project to develop elementary lead teachers in northeast Kansas schools. Forty-two elementary teachers attend a 3-week workshop on mathematics content and pedagogy consistent with the *NCTM Curriculum and Evaluation Standards.* The workshop is led by a team of university mathematicians, mathematics educators, and elementary teachers. Staff work closely with participants to design appropriate follow-up activities during the school year and make regular site visits. A workshop for principals is also held. It is estimated that the project directly involves 100 teachers. Cost-share by school districts and the university is 21 percent of the NSF award.

The Development of an Innovative Model to Enhance the Knowledge and Skill Levels in Basic Sciences for Secondary Agriscience Teachers

Award number:	9155350
Funding:	$534,253
PI:	Richard F. Welton
Co-PIs:	John R. Staver, Steven R. Harbstreit
Institution:	Kansas State University, Manhattan, KS
Dates:	May 1, 1992–October 31, 1995

This project provides a plan for enhancing the level of knowledge and skills in basic science for 75 secondary agriscience teachers. The project includes (1) the development of a yearly summer institute in basic and applied science concepts, (2) the methodology of teaching science, and (3) curriculum materials development designed to integrate the scientific concepts and teaching methodologies of the institute. Cost-sharing is equivalent to 51 percent of the NSF award.



A Collaborative Partnership Between High School and University Mathematics Faculty

Award number:	9154851
Funding:	$205,859
PI:	Elizabeth G. Yanik
Co-PIs:	Joe Yanik, Connie S. Schrock
Institution:	Emporia State University, Emporia, KS
Dates:	March 15, 1992–August 31, 1995

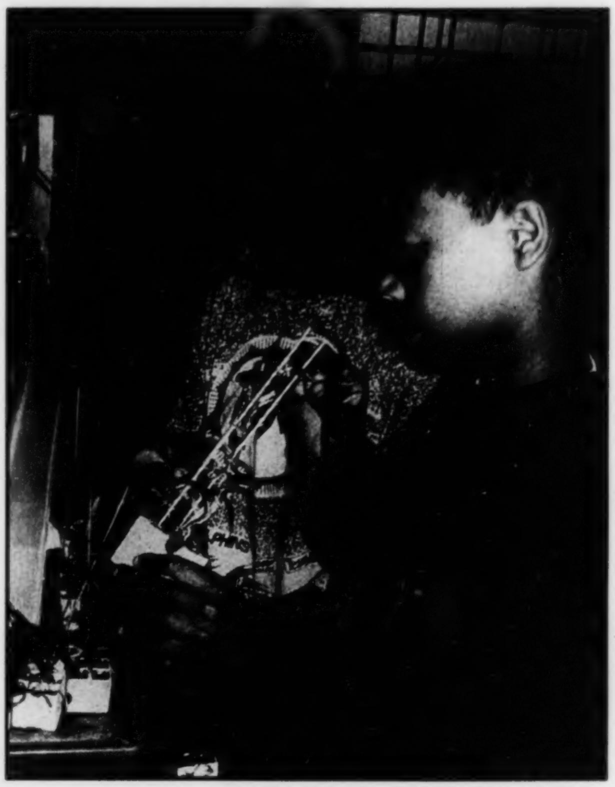
This teacher enhancement project includes an exchange component for secondary (middle school or high school) teachers and university faculty members. During each semester of the project, one university faculty member and one secondary school teacher are selected to co-teach a mathematics class at both the secondary school and the university. While the university participant visits other classes and work with teachers in the school setting, the school participant works with other university faculty and takes one mathematics course at the university. A series of summer seminars with the exchange participants is available for 20 educators from schools in the surrounding area. These 3-week seminars train the participants to use innovative teaching materials and methods tailored for topics in mathematics. The workshop also gives participants the opportunity to discuss with one another many of the major issues facing mathematics education today. Follow-up activities for all participants are provided during the academic year.

KENTUCKY

The Kentucky Middle Grades Mathematics Teacher Network

Award number:	9253194
Funding:	$2,818,533
PI:	William Bush
Institution:	University of Kentucky Research Foundation, Lexington, KY
Dates:	December 1, 1992–May 31, 1996

This project is developing a statewide network of middle grades mathematics teachers to provide opportunities for collaboration among classroom teachers, instructional supervisors, teacher educators, and university mathematicians. To align the mathematics content and teaching practices of the participating school districts, eight teams of university faculty, classroom teachers, and instructional supervisors are developing seminars designed to enhance the teaching of algebra, geometry, probability, and statistics. Pedagogical emphases include problem solving, use of manipulatives and technology, cooperative learning, and alternative forms of assessment. The teams conduct seminars throughout Kentucky for 300 middle grades teachers, who in turn conduct workshops and establish support groups for middle grades teachers in their respective districts. All eight state universities and four private colleges in Kentucky are participating in the project. Cost-share provided by the universities and the schools is 25 percent of the NSF award.



LOUISIANA

LSU Science Education for Public Understanding (SEPUP) Implementation Center

Award number: 9355643
Funding: $1,483,379
PI: Sheila Pirkle
Co-PIs: Frank K. Cartledge, Paul D. Lee, Ginnie Bolin
Institution: Louisiana State University Baton Rouge, Baton Rouge, LA
Dates: April 15, 1994–September 30, 1997

Consistent with the *Louisiana Curriculum Frameworks*, this project is increasing the use of activity-based, issues-oriented, technologically integrated physical science education at the middle school level (grades 7–9). Two cohorts of teachers from 30 schools are being paired into teams (60 teachers) for intensive training. A 2-year sequence of summer courses, academic-year site visits, and workshops constitute the professional development of teacher training. The summer courses are a sequence of two specially designed chemistry and physical science courses appropriate for the middle school level. In addition, teachers are trained in alternative assessment strategies, and the integration of computers and graphing calculators for analysis of experimental data. Cost-sharing is 14 percent of the NSF award.

Leadership Program for High School Biology, Chemistry, and Physical Science Teachers

Award number: 9155379
Funding: $178,653
PI: Stearns W. Rogers
Co-PI: Richard Ardoin
Institution: McNeese State University, Lake Charles, LA
Dates: July 1, 1992–December 31, 1995

This project provides activities designed to increase the quality and quantity of science taught in the high school classrooms and laboratories in southwest Louisiana and southeast Texas. The program consists of three components: (1) workshops on methodology and motivation to improve the quality and quantity of instruction, (2) peer-enhancement activities designed to provide participants opportunities to share their learning experiences with their peers, and (3) model-development activities designed for the in-service training of teachers in the local school system. This project involves 102 high school teachers of biology, chemistry, and physical science. Cost-sharing is equivalent to 44 percent of the NSF award.

Primarily Physical Science

Award number: 9254431
Funding: $1,695,976
PI: Lola F. Soileau
Co-PIs: Margie M. Montgomery, Mignon H. Morgan
Institution: East Baton Rouge Parish School Board, Baton Rouge, LA
Dates: August 1, 1993–December 31, 1998

The East Baton Rouge School Parish along with Panasonic, Monsanto, and Dow are sponsoring a districtwide teacher enhancement effort for physical science in grades K–3. This project builds on a state-funded pilot project in five elementary schools. Two teachers in each of the district's 63 elementary schools attend workshops and receive training in (1) the use of hands-on kits, (2) background science content, (3) inquiry teaching methods, (4) performance assessment of students, and (5) integration of science with other subjects. Principals of participating schools also receive 2 days of professional training. The project affects the diverse student population composed of nearly 60 percent of African-American, Hispanic, and other underrepresented groups. Cost-sharing on this project represents 79 percent of the NSF award.

Middle Grades Math/Science Project

Award number: 9153790
Funding: $445,539
PI: Carolyn F. Talton
Co-PIs: William C. Deese, Nancy Alexander
Institution: Louisiana Tech University, Ruston, LA
Dates: December 15, 1991–May 31, 1996

This project provides special course work in chemistry, physics, earth science, and astronomy for middle school science and mathematics teachers during the academic year. The courses emphasize the mathematical component undergirding the science content. These courses are being held at the school site and are attended by 25 teachers each year. In the summer, five selected teachers from the academic-year program are teamed with a chemistry or physics high school teacher to learn content and teaching techniques and undertake intensive training. Four-hundred fifty teachers have been involved in the professional development activities. Project staff are continuously monitoring and evaluating the accomplishments of the participants. The matching funds from the university and the schools constitute a match of above 48 percent of the NSF award.

MARYLAND

Mathematical Studies in Modeling at Mount Saint Mary's (MSM-2)

Award number: 9254458
Funding: $40,000
PI: John E. August
Co-PIs: Frederick J. Portier, Nancy W. Lewis
Institution: Mount Saint Mary's College and Seminary, Emmitsburg, MD
Dates: September 1, 1993–June 30, 1997

This project gives three groups of 24 high school teachers from the Mid-Atlantic region an in-depth experience in mathematical modeling. Participating schools are asked to send one mathematics teacher and one science teacher to a 1-year program. The capstone of the program is the week the teachers spend on-site at the Chincoteague National Wildlife Refuge, working on modeling problems of current interest (for example, beach erosion, migration, and traffic) to the Fish and Wildlife Service, which manages the refuge. Prior to the summer field experience, the teachers learn some of the mathematics that underlie modeling by attending six 2-day workshops. The workshops also expose teachers to writing lesson plans in modeling and sharing their experience and knowledge with other teachers and students. Results of the teachers' work will be made available to the Wildlife Service and the 1.5 million annual visitors to the refuge.

Physics Workshop for the Middle School

Award number: 9253211
Funding: $175,027
PI: Richard Berg
Institution: University of Maryland–College Park, College Park, MD
Dates: February 1, 1993–January 31, 1996

This project provides training for 20 middle school teachers. Emphasis in the workshops is on the study of physics through experimentation using the techniques of prediction, experimentation, observation, discussion, concept formation, and instructional techniques to be used in the classrooms. The workshops cover topics including acoustics, optics, electricity, and Newton's Laws. Participants are given a collection of experimental apparatuses, together with a manual discussing the experiments that can be performed with the apparatuses. Follow-up activities include a physics demonstration program to be given cooperatively by the workshop director and the participating teacher for the students in the schools. Cost-sharing is 31 percent of the NSF award.

Kindergarten Science: Foundations for Understanding

Award number: 9155208
Funding: $253,833
PI: Bo Ann Bohman
Co-PI: Michael P. Perich
Institution: Carroll County Public Schools Education, Westminster, MD
Dates: July 1, 1992–December 31, 1995

This project provides training for 50 kindergarten teachers and teaching assistants for the new kindergarten science curriculum that was recently developed in the Carroll County Public School System. This curriculum is based on a constructivist approach and incorporates educational approaches that are suitable for young children. Teachers are provided with the necessary content and process knowledge in science, and kindergarten instructional assistants are trained to ensure their role in successfully supporting science instruction in the classroom. A leadership team is available for guidance to colleague teachers and to new kindergarten teachers needing appropriate science in-service and peer coaching. Cost-sharing is 66 percent of the NSF award.

Project IMPACT: Increasing the Mathematical Power of All Children and Teachers

Award number: 9454187
Funding: $541,124
PI: Patricia F. Campbell
Co-PI: Thomas E. Rowan
Institution: University of Maryland–College Park, College Park, MD
Dates: September 1, 1994–August 31, 1995

This project provides in-school support for 25 fourth grade and 25 fifth grade teachers in schools where *Project IMPACT* has a K–4 research and implementation project being completed. This is an extension of an ongoing 5th grade joint research and teacher enhancement project in elementary mathematics education implementation in urban school districts. The project conducts intensive teacher enhancement for grades K–3, along with longitudinal data collection on students as they progress from kindergarten through 3rd grade. The project extension continues with these students and their teachers until completion of the 5th grade. The project also has a strong research component focusing on the issues of performance, behaviors, and beliefs related to mathematics. Cost-sharing is 31 percent of the NSF award.

Aquatic Science Teacher Institute for Master Teachers of "Living in Water"

Award number:	9254451
Funding:	$233,582
PI:	Valerie C. Chase
Co-PIs:	Sylvia James, Martha Nichols
Institution:	National Aquarium in Baltimore, Baltimore, MD
Dates:	March 15, 1993–August 31, 1998

Living in Water is a hands-on life science instructional project for upper elementary and middle school grades. Teachers in the Chesapeake Bay region have been given access to training workshops for a number of years, and now the project offers training to teachers from across the country. Summer workshops take place at Towson State University to train 72 regional master teachers. These workshop participants learn to teach *Living in Water* in their own classrooms and gain a deeper understanding of the biology, chemistry, and physics that underlie the activities in the curriculum. Cost-sharing represents 46 percent of the NSF award.

Summer Industrial Fellowships for Teachers: An Expanded Program

Award number:	9155320
Funding:	$860,380
PI:	John M. Fowler
Co-PI:	Lauren Williams
Institution:	Triangle Coalition for Science and Technology Education, College Park, MD
Dates:	February 15, 1993–July 31, 1996

This project replicates the current summer internship programs that are being carried out nationwide. In phase I of the project, the Triangle Coalition holds a teleconference on the development of summer internships for teachers. Twenty-five sites are selected to represent a geographic and demographic balance. After the teleconference, project staff develop intern placements at businesses and industries in the region. Videotapes are also produced to help in the dissemination of the internship programs. The Triangle Coalition is developing a large-scale promotion program and is putting in place a regional consulting network to help new project sites get started. The matching funds from business and industry exceed a 10-to-1 match of the NSF award.

Building Bridges for Cooperation in Physics Education

Award number:	9453830
Funding:	$112,719
PI:	Teodoro Halpern
Co-PI:	Bernard V. Khoury
Institution:	American Association of Physics Teachers, College Park, MD
Dates:	June 15, 1994–November 30, 1996

Forty participants from the United States attend the Fifth Inter-American Conference on Physics Education. These participants include 20 high school physics teachers and 20 physics faculty from 2- and 4-year undergraduate institutions. The goal of the conference is to build bridges for cooperation among physics educators in the Americas and Caribbean and to extend networks that were established through previous Inter-American Conferences on Physics Education. The particular emphasis of this conference is to improve the preparation of teachers from the United States to teach students of the emerging majorities. The conference design includes simultaneous translators at the conference and translation of the conference's papers from the original languages. The papers then are grouped by grade level and published in booklet form for use by elementary, high school, and university teachers. The conference was held at Texas A&M University in College Station, Texas, July 17–22, 1994.

High School Teacher Summer Research Fellowships

Award number:	9155224
Funding:	$375,000
PI:	Charles Hancock
Institution:	American Society of Biochemistry and Molecular Biology (ASBMB), Bethesda, MD
Dates:	May 15, 1992–October 31, 1995

This project provides an opportunity for high school biology teachers to spend a summer doing full-time research in the laboratory of a member of the ASBMB. This nationwide program emphasizes the identification and selection of highly motivated teachers who, upon their return to their home schools, have a continuing impact on the quality of science education through the implementation of innovative topics and hands-on exercises. Emphasis is placed on the recruitment of teachers from schools that serve large numbers of minority students. On the basis of previous experience, it is anticipated that this program may have an impact on science education at the secondary level and have at least an indirect impact on career choices made by some secondary students. Cost-sharing equals 180 percent of the NSF award.

Frontiers in Physiology: An Enhancement Program for Teachers

Award number: 9355658
Funding: $1,174,699
PI: Marsha Matyas
Institution: American Physiological Society, Bethesda, MD
Dates: August 1, 1994–November 30, 1996

This project improves science education by building the scientific research community into a support infrastructure for teachers. Ongoing relationships between researchers and teachers are being established through research and in-service experiences and computer networks. The project goals are being met through the Summer Research in Physiology Program and the Joint Teacher-Researcher Physiology In-service Program. During the Summer Research Program, teachers conduct research in physiology laboratories and participate in additional professional activities. In the In-service Program, teachers and researchers develop lab lessons for physiology in-service workshops, focusing on effective pedagogical techniques. More than 500 teachers, nationwide, participate in the project. Special features of the program include (1) connecting teachers to global resources via computer networks, (2) producing a videotape modeling effective pedagogical techniques, (3) developing an Internet-accessible databank of physiology lessons, and (4) focusing throughout the project on gender, racial, and ethnic equity. The project serves as a model for professional organizations and provide materials and methods for in-service providers.

Engineering–Mathematics Training Institute (EMTI)

Award number: 9254599
Funding: $213,758
PI: Richard H. McCuen
Co-PIs: Thomas M. Regan, R.P. Schlenker
Institution: University of Maryland–College Park, College Park, MD
Dates: March 15, 1993–August 31, 1995

This project integrates engineering with mathematical and scientific concepts through hands-on experiments and videotapes. Each year, 20 high school teachers are chosen from counties in Maryland and from Baltimore City. The teachers' summer training exposes them to ready-to-use modules, laboratory kits, and field trips to the National Aeronautics and Space Administration and the National Institute of Standards and Technology. During the academic-year, the teachers meet to discuss classroom applications, and *EMTI* faculty visit schools and maintain their contact with participants. *EMTI* and the NSF young scholars program run simultaneously, affording unique opportunities for shared learning and interaction between teachers, students, and University of Maryland faculty. Estimated cost-sharing is 18 percent of the NSF award.

Mathematics Content/Connections

Award number: 9353364
Funding: $2,046,903
PI: L.J. Odom
Co-PI: Norma B. Mellott
Institution: Montgomery County Public Schools, Rockville, MD
Dates: February 15, 1994–July 31, 1998

This project provides training and activities in the areas of mathematics content, pedagogy, and assessment for all the elementary school teachers, K–6, and school administrators in Montgomery County, Maryland. Teachers are involved in up to 60 hours of preparation in content modules including extensive attention to how children learn the content. Each school is responsible for hosting the training and involving all of its faculty and administration. An additional 30 hours of activities are used by the entire faculty focusing on their needs assessment following the content component.

The project materials are based on a broad base of materials from the mathematics reform and the research base being developed through another NSF-funded project: *Project IMPACT* carried out in the district. Project staff and district leaders are available to teachers and administrators through assignments that allow involvement in the activities and availability for site support. Additional support is being developed through area colleges and universities, which are planning to extend offerings for teachers and to use the program as a model for the preservice education. The district monitors student performance on several measures, including standardized testing, state testing, and district assessment programs, which are being developed to include performance-based activities. In addition, the project monitors teacher and administrator changes through participant surveys and classroom observations.

Development of Teacher Competence in Classroom Use of Scientific Data Sets

Award number: 9253252
Funding: $1,118,596
PI: Robert Ridky
Institution: University of Maryland–College Park, College Park, MD
Dates: September 1, 1992–February 29, 1996

In an effort to increase both the use of technology and actual data in education, this project uses computers and CD-ROM technology to bring scientific data and curriculum material developed by the National Aeronautics and Space Administration, the National Oceanographic and Atmospheric Administration, and the U.S. Geological Survey in the *Joint Education Initiative (JEdI)* Project into the classroom. The use of these materials allows teachers and students to investigate their own questions relating to global and astronomical phenomena. Scientists who developed the CD-ROM disks, university faculty, and industry personnel serve as mentors to assist teachers in the use of government data and in its instructional application. Two hundred and twenty-five teachers from around the country are trained during the project. Training occurs at the University of Maryland–College Park and Western Washington University. Another 660 teachers receive training from lead teachers, increasing the total number of teachers reached in the project to 885. Cost-sharing is 27 percent of the NSF award.

Interactive Bibliographic Database Resources for Elementary School Science

Award number:	9253142
Funding:	$1,067,473
PI:	E. Wendy Saul
Institution:	University of Maryland–Baltimore County, Baltimore, MD
Dates:	December 1, 1992–May 31, 1997

In a collaborative effort with Scholastic Press, a commercial bibliographic software package is being developed. This microcomputer-based system provides teachers and librarians with information on science trade books for children. The CD-ROM software runs on IBM, Apple, and Macintosh computers. This computerized bibliographic resource contains titles, content descriptions, annotations concerning hands-on activities and materials, treatment of gender and ethnic issues, suitability for students with physical disabilities or Limited English Proficiency, and brief reviews by teachers and children's literature specialists. The software also contains an auditing function that records how users navigate through the database query system. These audit data can be used to monitor how children, teachers, and librarians approach the use of science trade books. By increasing access to appropriate literature and trade books, this information resource encourages teachers to use science as a way to expand reading and language arts instruction, and improves the integration of instruction across traditionally separate disciplines. Cost-sharing represents 146 percent of the NSF award.

Integrating Science Across the Elementary and Middle School Curriculum

Award number:	9353454
Funding:	$774,060
PI:	E. Wendy Saul
Institution:	University of Maryland–Baltimore County, Baltimore, MD
Dates:	October 1, 1993–March 31, 1998

The *Elementary Science Integration Project* (*ESIP*) promotes integration of hands-on, inquiry-centered, elementary school science instruction with language arts and other subject areas. Teachers are encouraged to work as classroom researchers engaged in action research with students on a variety of topics that arise in the classroom. Teacher enhancement activities include two summers and the intervening academic year. The teachers work on recognizing and pursuing topics of interest to their students. Past *ESIP* participants have been extremely productive in writing and publishing the results of their classroom research and in sharing their experiences with other teachers through presentations and in-service workshops. Expansion of *ESIP* creates a large cadre of classroom teachers who are capable of fostering inquiry activities that cross disciplinary boundaries. Cost-sharing is 23 percent of the NSF award.

Baltimore Elementary Science Teaching Project

Award number:	8954567
Funding:	$1,295,002
PI:	Leon Ukens
Institution:	Towson State University, Towson, MD
Dates:	May 1, 1990–October 31, 1996

Towson State University, in collaboration with the Baltimore City Public Schools (BCPS) and the National Urban Coalition (NUC), are sponsoring a project that reinforces the newly adopted hands-on science curriculum for all of the 124 elementary schools in the city of Baltimore. This is part of Baltimore's *Operation Turnaround*. This project provides teacher training opportunities for 2,000 elementary teachers (grades K–5) to help them implement and phase in this new curriculum. Meaningful involvement by the principals as well as the community reinforces the teachers' efforts.

Twelve science educators, sixteen teachers, two principals, members of the BCPS science supervisory staff, the project director, and associate project director are leader coaches. These leaders provide continued direct support to the school during the summer and school years. Two teachers from each school participate in leadership training, as well as content and instructional updating. In total, 124 schools participate in a 5-day intensive summer workshop held in one of the Baltimore County Public Schools and taught by selected members of the leader coach team. In addition, teachers elect to take up to four content courses at the university to update their science backgrounds. Specific activities for parents and community members are included in the project. A *Say Yes to Science* Communications Kit for active community members, the use of *Family Math* and *Family Science* (from Lawrence Hall of Science, EQUALS, and NUC) in parent workshops, and field trips to the Maryland Science Center, the National Aquarium, and the Baltimore Zoo are components of the school support program. Principals also participate in workshops to understand and support the reforms being made at each school. The Baltimore City Public Schools cost-share is 38 percent of the NSF request with an additional 2 percent coming from other sources.

The Development of Teacher Enhancement Activities Based on Indicators of Institutionalization of an Exemplary Science Curriculum

Award number:	9355531
Funding:	$837,295
PI:	Dean A. Wood
Co-PI:	Paul J. Hummer
Institution:	Hood College, Frederick, MD
Dates:	June 1, 1994–November 30, 1997

This project develops, implements, and evaluates a model for providing teacher enhancement activities to schools that have maintained exemplary elementary science programs over an extended period of time. The project (1) identifies indicators that measure the extent of institutionalization of exemplary elementary science programs and applies the identified indicators to a study of NSF-supported Frederick County *Science Curriculum Improvement Study*, (2) develops and implements teacher enhancement activities within these schools based on findings from this study, and (3) uses these indicators to evaluate the impact of the enhancement activities and to allow the school system to continuously monitor and respond to its teacher enhancement needs.

Eighteen weeks of training are provided to seven science specialists and 9 weeks to 30 school-based lead teachers. Project staff and these trained specialists and lead teachers provide training to the remaining teachers in the county based on their identified needs. Teachers are categorized by need into four categories: (1) new users, (2) inexperienced mechanical users, (3) experienced mechanical users, and (4) experienced constructivist users. All 750 elementary teachers in the county receive enhancement. Cost sharing is 12 percent of the NSF award.

MASSACHUSETTS

Math/Science Enhanced Manufacturing Center

Award number: 9153911
Funding: $151,861
PI: James Amara
Co-PI: George Taliadouros
Institution: Minuteman Regional Vocational Technical School, Lexington, MA
Dates: August 15, 1991–January 31, 1996

This project is developing a pilot manufacturing facility to create automated electronic systems used by high-technology manufacturers. The facility is managed and operated by student teams, under the supervision of Minuteman faculty. The students are learning how to run a small business, control work flow, maintain quality, and handle technical problems. This facility links traditional academic instruction with practical, hands-on experience within the environment of a technical high school.

Math/Science Enhanced Manufacturing Technology Training for Females and Minorities

Award number: 9453921
Funding: $356,076
PI: James Amara
Co-PI: George Taliadouros
Institution: Minuteman Regional Vocational Technical School, Lexington, MA
Dates: September 1, 1994–August 31, 1996

A pilot manufacturing laboratory facility has been established at Minuteman Science and Technology High School. A formal curriculum in manufacturing technology has been developed. This project develops an integrated manufacturing instructional model for 30 women and minority teachers of grades 6–12. Participants are introduced to the project through three seminars. The seminars cover equity issues and manufacturing technology. During the summer, the participants receive an intensive 3-week workshop on current trends and practices in manufacturing. Topics include automation, electronics, mechanics, and bio-manufacturing. Emphasis is placed on integrating mathematics and science, the importance of communication and human relations, technology skills related to manufacturing, career awareness, and hands-on activities appropriate for junior and senior high student. Each academic year, the original 30 teachers acquire more complex integrated mathematics, science, and technology skills, coupled with specific workshops on women and minority issues as they begin to develop integrated projects suited to their teaching environment. Cost-sharing is 229 percent of the NSF award.

Southeastern Massachusetts Outdoor Elementary Science Education Project

Award number: 9154826
Funding: $314,604
PI: Robert F. Boutilier
Co-PIs: William Perkins, Barbara Waters
Institution: Bridgewater State College, Bridgewater, MA
Dates: June 15, 1992–November 30, 1995

In collaboration with the Massachusetts Audubon Society, local school districts are incorporating outdoor science education as an integral part of their elementary school science curriculum. The region covered by this project includes much of southeastern Massachusetts. Teachers receive training in the content and instructional methods necessary to help design and implement this new curriculum. One-hundred-twenty teachers are attending a 2-week summer workshop at one of several Audubon nature centers, where they learn to develop instructional activities based on outdoor habitats close to their schools. Staff from Bridgewater State College and the nature centers work together to help the teachers refine their use of local environments for instructional purposes. More than 32 local school districts are participating in this project. Cost-sharing amounts to 33 percent of the NSF award.

Teacher Enhancement in Pedagogy and Ecology

Award number: 9253280
Funding: $2,657,192
PI: Prassede Calabi
Co-PI: Douglas F. Ryan
Institution: TERC, Cambridge, MA
Dates: February 15, 1993–July 31, 1996

This project develops partnerships between high school teachers, ecologists, and pedagogy experts in an effort both to enable teachers to experience the process of science and to implement effectively a constructivist curriculum in their classrooms. Teachers participate in two summer workshops and numerous activities spaced throughout the year. Two-hundred-forty high school teachers from Massachusetts, New York, and Texas may participate in the workshops, which are held in the state of New York. Teacher and ecologist participants are selected in an effort to establish long-term collaborations between these groups. Cost-sharing for the project is 3 percent of the NSF award.

Empowering Teachers: Mathematical Inquiry Through Technology

Award number:	9153760
Funding:	$1,270,452
PI:	Richard C. Carter
Co-PI:	Denis Newman
Institution:	Bolt Beranek and Newman (BBN), Inc., Cambridge, MA
Dates:	November 1, 1991–April 30, 1996

This project is conducting a project to develop and assess the strategies, art, and practice of mathematical inquiry teaching in middle school classrooms. The project employs interactive computer software and video technology as key instructional tools for fostering inquiry learning and teaching skills. The project comprises four graduate-level courses, two of which, *Reasoning About Data* and *Mathematical Exploration and Experiment*, were developed in a recently completed teacher enhancement grant. The two new courses, *Animated Geometry* and *Interactive Algebra*, draw extensively on computer activities for supporting inquiry teaching. The courses are field-tested at the University of Massachusetts, Boston; Lesley College, Cambridge; and the Educational Collaborative. The extent to which teachers change as a result of these courses is being documented. The courses are endorsed by the Massachusetts Department of Education and disseminated statewide by the Massachusetts Corporation for Educational Telecommunications (MCET). National dissemination is through pre-conference workshops of relevant organizational meetings such as NCTM or the American Educational Research Association. Over 240 middle school teachers are involved in the development and piloting of these courses. Logo Computer Systems, Key Curriculum Press, EdCO (a consortium of school districts in the greater Boston area), MCET, and BBN cost-sharing accounts for 7 percent of the NSF award.

The Mathematical Inquiry Videotapes: Tools for Professional Growth

Award number:	9254485
Funding:	$1,551,521
PI:	Richard C. Carter
Institution:	Bolt Beranek and Newman, Inc., Cambridge, MA
Dates:	April 1, 1994–August 31, 1996

This project is developing and disseminating ten 20-minute videotapes for use in pre- and in-service programs for middle school mathematics teachers. The tapes deal with problems that arise when teachers try to introduce inquiry-based learning into their classrooms. The videotapes focus on (1) the use of technology as an effective tool for supporting student investigations and (2) the role of the teacher in facilitating student conversations about mathematics. Each tape highlights a particular issue, such as characteristics of inquiry-oriented tasks, management of pair- and small-group work, or when to intervene. The tapes feature an actual setting of teachers and students in the classroom. They are based on pieces of curriculum that principal investigators of major curriculum projects have identified as being particularly suited for illustrating various aspects of inquiry learning.

In addition to the classroom footage, each tape also shows teachers reflecting on the issues illustrated on the tape. The tapes are to be pilot-tested in a variety of settings, including television broadcasts to teachers, regional summer workshops, and school-site workshops. A national advisory board, as well as an outside evaluator, monitor the development of the tapes throughout the various stages of development, from initial script outlines to raw video footage, to pilot-testing, and on to the final edited product. The completed packets, consisting of a videotape and appropriate accompanying print material, are available to NSF-funded teacher enhancement projects and to others through EdCo (a consortium of greater Boston school districts), the Massachusetts Corporation for Educational Telecommunications, and a private publisher. Cost-sharing is 11 percent of the total NSF award.

UPDATE: University Physics Departments and Alliance for Teacher Enhancement

Award number:	9155251
Funding:	$1,236,772
PI:	Leroy F. Cook
Co-PI:	Klaus Schultz
Institution:	University of Massachusetts–Amherst, Amherst, MA
Dates:	February 15, 1993–July 31, 1996

Four campuses of the University of Massachusetts system (Amherst, Dartmouth, Lowell, and Boston) are designing a regional network to support the high school physics teachers in the area. Each campus offers a 3-week commuter workshop, at which 24 teachers learn about contemporary research topics in physics and strategies for incorporating this new content knowledge into their classroom instruction. The most experienced teachers at these workshops attend a week-long residential institute devoted to developing new classroom activities based on the research topics presented. These activities are being disseminated to all school districts in the region, and through the NSF-supported Massachusetts *Statewide Systemic Initiative, Project PALMS*. Each campus also establishes a permanent teachers' resource center within its physics department. The centers offer teachers the loan of equipment for classroom use and provide ongoing help in the form of workshops, network meetings, newsletters, and interactions with members of the research faculty. Cost-sharing on this project represents 22 percent of the NSF award.

Leadership for Urban Mathematics Reform

Award number:	9353449
Funding:	$2,536,046
PI:	Mark J. Driscoll
Co-PIs:	Grace Kelemanik, Barbara A. Miller
Institution:	Education Development Center, Newton, MA
Dates:	July 1, 1994–November 30, 1996

This project continues a collaboration with six of the *Urban Mathematics Coalitions* in major cities around the country to prepare teachers to become change agents and assume leadership positions in a systemic reform of mathematics teaching, curriculum, and assessment in their respective districts. To encourage cross-grade dialog, participants are selected in teams consisting of both middle and high school teachers. The project consists of three phases.

In phase 1, teachers are asked to initiate four structured experiments (open-ended problems) in their classrooms and to meet 10 times during the semester to reflect on, critique, and discuss what these experiments reveal about the nature of mathematics and how it can be effectively taught and learned. They also develop individual action plans for further changes in their teaching practices. Phase 2 consists of an intensive 4-week institute, in which the teachers themselves do mathematical inquiries at their own level, continue their discussions of the teaching of mathematics, and learn and practice leadership skills. In phase 3, they examine and help reshape their district's reform plans, continue changing their own classrooms practices, and with support of project staff, begin outreach programs in their districts. A total of 172 teachers participate in the project. Cost-sharing is 22 percent of the total NSF award.

The Maury Project: Exploring the Physical Foundations of Oceanography

Award number:	9353370
Funding:	$868,191
PI:	Ira W. Geer
Co-PI:	David R. Smith
Institution:	American Meteorological Society, Boston, MA
Dates:	January 1, 1994–December 31, 1997

This project, sponsored by the American Meteorological Society in partnership with the United States Naval Academy and assisted by the National Oceanic and Atmospheric Administration and the State University of New York–Brockport, is conducting a national teacher enhancement program to train 72 master precollege teachers in the physical science foundations of selected topics in oceanographic science. The teachers are mainly middle school teachers (grades 6–8), joined by some high school teachers (grades 9–12). The teachers attend a 2-week summer program with follow-up sessions during the academic year and the following summer. All participants are expected to carry out in-service activities. Based on the experience of earlier projects, it is anticipated that more than 1,500 teachers will be affected by the project. In addition to the teacher enhancement component, the project develops modules in oceanographic science using the most up-to-date information prepared by experts in the field. Based on these teaching materials, an instructional resource manual, including classroom-ready activities, is being produced and distributed directly to teachers.

Project ATMOSPHERE: Providing the Nation's Precollege Teachers of Grades 5–9 with Instructional Resource Materials and Learning Experiences in the Atmospheric Sciences

Award number:	9153823
Funding:	$3,059,555
PI:	Richard Hallgren
Co-PI:	Ira W. Geer
Institution:	American Meteorological Society, Boston, MA
Dates:	September 1, 1991–February 29, 1996

Project ATMOSPHERE is part of a national program of the American Meteorological Society designed to encourage teachers of grades 5–9 to use the atmospheric environment to heighten interest in and relevancy of science. This project (1) establishes a permanent national network of precollege Atmospheric Education Resource Agents (AERA's); (2) produces scientifically accurate, up-to-date, and pedagogically sound resource and instructional materials aimed at teachers; and (3) disseminates and implements these materials. An extensive training program followed by annual renewal sessions produces a steady state network of 70 to 80 AERA's.

With representation in every state, the network builds on the strengths of resource agents who come to the project as recognized master teachers and professional leaders in their home areas. They participate in project materials development and play major roles in disseminating information and implementation activity. Phase I includes workshops at National Weather Service Training Centers. Over 100 AERA's receive phase II training at a 2-week workshop in Boulder, Colorado, and Norman, Oklahoma, in alternating years. One-week follow-up workshops for 55 teachers are also held. Each AERA is responsible for delivering a minimum of two peer-led workshops each year. Two-hundred reference and resource papers on atmospheric environment topics, annually published newsletter/information packets, and 10 self-contained instructional modules are being produced. Dissemination ranges from mailings of materials to the offering of informational sessions by AERA's. The instructional materials are implemented in workshops arranged and conducted by AERA's. One-thousand information and training sessions take place with an estimated 20,000 teachers enrolled. Cost-sharing equals 75 percent of the NSF award.

Exploring for Consensus on Major Problems in Education

Award number: 9409794
Funding: $20,000
PI: Howard Hiatt
Institution: American Academy of Arts and Sciences, Cambridge, MA
Dates: April 1, 1994–September 30, 1995

A 2½-day national conference entitled *Exploring for Consensus on Major Programs in Education* builds on the *Initiatives for Children* efforts to develop ties among researchers, practitioners, and policymakers working for systemic reforms in education. Although not exclusively tied to mathematics and science, the conference seeks to address the quality of teaching and instruction in secondary schools. The expectation is that the stature and expertise of the assembled group results in recommendations of national import and that the stature of the academy ensures wide interest in the dissemination of the findings. Fifteen to 20 participants drawn from all regions and related interests are expected to attend. A document representing the consensus of the participants will be available to all groups concerned with secondary education, ranging from policy-setting agencies to individual classroom teachers. Although some expenses are absorbed by the center, there is no specific commitment to cost-sharing.

A Cooperative Program to Enhance the Teaching of Science Using Marine Mammal Research for Grade 5–8 Teachers

Award number: 9155175
Funding: $446,476
PI: John C. Jahoda
Co-PIs: David Wiley, Charles C. Robinson
Institution: Bridgewater State College Foundation, Bridgewater, MA
Dates: May 1, 1992–October 31, 1995

This project trains teachers in hands-on inquiry teaching with field science. The project involves 180 teachers of grades 5–8 in summer and academic-year workshops on marine biology. These workshops provide opportunities to engage in research emphasizing the use of mathematical concepts for problem-solving in science. During the summer, the teachers are involved in field experiences in biology and marine mammal science that expose them to data gathering and research methodology. Teachers develop knowledge and skills in hypothesis formation, data collection, and analysis. During the academic year, teachers are involved in curriculum development, the development of computer simulations, and analysis programs. The approach is interdisciplinary, emphasizing the use of mathematics in science.

Sea Experience: Theoretical and Practical Summer Programs of Teacher Enhancement in Marine Science

Award number: 9253324
Funding: $1,017,028
PI: Paul S. Joyce
Co-PI: John C. Wigglesworth
Institution: Sea Education Association, Woods Hole, MA
Dates: February 15, 1993–July 31, 1995

This project offers two intensive summer institutes each year in marine and nautical sciences, one for elementary school teachers and one for middle through high school science and mathematics teachers. The summer institutes provide participants with a general knowledge of marine sciences, ideas of field and lab work that can be implemented in the classroom and practical experience of a team conducting scientific research. Twenty-three elementary school teachers and 23 middle and high school teachers are selected nationally each year to participate in the summer institutes. The *Sea Experience* programs begin with shore-based, 3-week components held in Woods Hole, Massachusetts, at SEA's campus. There, teachers participate in courses emphasizing basic concepts in physics, chemistry, geology, and biology that are related to studies of the ocean. The final 10 days of each program are spent on board one of SEA's fully equipped oceanographic research sailing vessels, where teachers participate in the practical hands-on experience of carrying out research projects and operating the vessels. Follow-up activities include annual workshops for *Sea Experiences* participants and teachers conducting two in-service training workshops in their home states. Teachers are provided with a large variety of materials to use in their own teaching. Cost-sharing is 34 percent of the NSF award.

Dissemination Plan for the Industry Volunteer Model

Award number: 9454178
Funding: $49,597
PI: Grace Kelemanik
Institution: Education Development Center, Newton, MA
Dates: August 1, 1994–September 30, 1995

This is a dissemination/conference project replicating an *Industry Volunteers in the Classroom* model developed over the past several years at the Education Development Center (EDC). The model involves a collaborative effort between private companies and schools. Companies in the project area are providing volunteer employees to act as substitutes while the classroom teachers attend teacher enhancement workshops during the regular school day. The current project has two components: (1) "getting the word out" to potentially interested parties (for example, principal investigators of *SSI's* and *USI's*, and other teacher enhancement projects) and (2) providing technical assistance to those seriously interested in implementing their own volunteer model. Such assistance includes providing a handbook that details how such cooperative ventures can be initiated, organized, and executed; sending an EDC resource team to the potential implementation site; and telephone conferencing. At the end of

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the project, a 1-day conference is held at EDC for groups that are ready to begin their implementation. Cost-sharing is 5 percent of the NSF award.

Implementation of the National Council of Teachers of Mathematics Standard in Discrete Mathematics

Award number: 9155165
Funding: $1,703,960
PI: Margaret Kenney
Institution: Boston College, Boston, MA
Dates: May 1, 1992–October 31, 1995

This project provides training for mathematics teachers of grades 7–12 in the area of discrete mathematics to introduce the topics in the classrooms. Discrete mathematics content areas include social choice, graph theory, recursion, counting, and matrices. Two possible ways to fuse discrete mathematics into the secondary curriculum are being introduced at the workshops: (1) a separate course in discrete mathematics for upper secondary students and (2) an infusion of discrete mathematics topics into all existing secondary mathematics classes, beginning at the middle school level.

Project activities include an initial 3-week summer leadership workshop for 22 teachers with experience in teaching discrete mathematics. These lead teachers, together with Presidential Award winners who are members of the project's senior staff, conduct 3-week summer workshops in six regions of the country. Three-hundred-sixty second-wave teachers participate in these workshops, which include a follow-up session to bond teachers at the local level into a support network for implementing discrete mathematics. In turn, these teachers are expected to conduct in-service activities within their school districts, reaching 4,000 of their colleagues in third-wave enhancement, for a total of 4,382 teachers. Boston University, University of North Carolina, Illinois State University, Southwestern Texas University, Portland State University, and California State Polytechnic cost-sharing accounts for 3 percent of the NSF award.

Teacher Enhancement Electronic Communication Hall (TEECH)

Award number: 9355605
Funding: $530,668
PI: Jack Lochhead
Institution: TERC, Cambridge, MA
Dates: September 1, 1994–August 31, 1995

A principal task of this project is to establish a network that can eventually substitute for the annual Teacher Enhancement Principal Investigators' meeting. This network enables principal investigators with similar interests to exchange information and views, and it also provides databases, lists, and World Wide Web "home pages," which contain information of interest to the educational communities and the general public. The key concepts for *TEECH* are (1) a distributed, electronically united seminar and (2) moderated online discussions, based on the *LABnet* model. Cost-sharing is 23 percent of the NSF award.

The Algebra Project in Mississippi: Evaluation and Implementation Activities

Award number: 9450258
Funding: $631,080
PI: Robert Moses
Co-PI: Ceasar L. McDowell
Institution: Algebra Project, Inc., Cambridge, MA
Dates: February 15, 1994–July 31, 1995

Over the past several years, the Algebra Project, Inc., has been developing a set of inquiry-oriented, experience-based middle school materials designed to give young minority students the opportunity to complete college-track mathematics programs in high school. The *Algebra Project* materials, designed to supplement other middle school curricula, are currently being implemented in a number of predominantly urban sites around the United States. The project targets 32 schools, including a few in Jackson, as well as many isolated rural schools in the Delta. Project staff supports the implementation efforts of 78 teachers through periodic workshops, meetings, and class visitations. Strong support also comes from school administrators, parents, and community leaders. Concurrent with the implementation efforts, a national panel of six evaluation experts is conducting an intensive short-term evaluation study to look at the *Algebra Project* materials themselves, as well as the Mississippi Delta implementation model in hopes of replicating the model. Cost-sharing is 10 percent of the NSF award.

Mathematics for Tomorrow

Award number: 9254479
Funding: $2,653,592
PI: Barbara Nelson
Institution: Education Development Center, Newton, MA
Dates: August 1, 1993–November 30, 1997

This project, involving a total of 80 K–8 teachers in the greater Boston area, has three basic aims: (1) to shift teachers' beliefs about the nature of teaching and learning mathematics, (2) to broaden the teachers' knowledge of mathematics itself, and (3) to introduce new instructional practices into the classroom. In phase I, the three participating districts each send eight teachers, a principal, a mathematics supervisor, and an associate superintendent to participate in a 4-week summer institute. This institute is followed by inquiry groups, which meet every other week after school, facilitated by project staff during school year. Activities focus on changing beliefs and practices of participating teachers. In phase II, the project begins a collaboration with EdCo, a consortium of school districts in the greater Boston area. Phase II involves 36 new teachers. Research and evaluation are important components of this project, which seeks to document and understand the teachers trying to make significant changes in their professional views and practices. Finally, a dissemination strand, aimed at developing teacher enhancement materials for use by others, will be presented by participants and project staff at professional meetings.

Buzzards Bay Rim Project

Award number:	9253292
Funding:	$956,276
PI:	Timothy O'Sullivan
Institution:	University of Massachusetts–Dartmouth, North Dartmouth, MA
Dates:	February 1, 1993–July 31, 1996

This project is a collaborative effort among universities, informal science centers, and local school districts seeking to train science teachers and administrators in hands-on inquiry teaching. Teachers and administrators in every elementary school in the region surrounding Buzzards Bay in southeastern Massachusetts receive training. One-hundred schools in the nine school districts are participating. The region has a high proportion of minority students and recent Portuguese immigrants, who are part of a poorly educated population. The teachers receive more than 50 hours of training and attend two summer institutes devoted to inquiry-based pedagogy and assessment. Each district has a leadership team consisting of leader teachers, principals, and district administrators, and the leadership teams are working together to reform their science instruction. Pre-service teachers at the University of Massachusetts–Dartmouth are assigned as mentees to these science leaders. Scientists from Woods Hole Oceanographic Institute and Lloyd Environmental Center are available as science content resources. This project coordinates its activities with the State Department of Education and NSF-supported *Massachusetts State Systemic Initiative*. The New Bedford School district participates in both projects, and provides a meeting ground for integrating the efforts. Interactions with the *Massachusetts State Systemic Initiative Project PALMS* allow this approach to be duplicated throughout the State. Cost-sharing represents 83 percent of the NSF award.

Vermont Elementary Science Project

Award number:	8955297
Funding:	$776,629
PI:	Robert Prigo
Co-PI:	Susan Loucks-Horsley
Institution:	Network, Inc., Andover, MA
Dates:	April 15, 1990–September 30, 1995

This project is based on recommendations from recent reports of the National Center for Improving Science Education concerning assessment, curriculum and technology, and teacher development in elementary science. The project has produced a regional staff development and training model for improving elementary science education. This model for instructional change is developed through extensive work with existing state structures such as the Vermont State Education Department, the Vermont Science Teachers' Association, the Vermont Higher Education Consortium, Middlebury College, and local school districts. Teams of teachers and administrators from the selected school districts are trained in the following areas: (1) physical science content, (2) "hands-on/minds-on" teaching methods, (3) ideas related to the conditions in schools that support science education and change, and (4) implementation plans for improving science teaching at the elementary school level. The project then provides continuous support for the changes necessary to implement and sustain good science teaching and good science programs in these districts. The evaluation of the program includes addressing the issue of student change, and is based on the State's new assessment program that involves evaluating the products produced for student portfolios. Cost-sharing for the project is 35 percent of the NSF award.

Creating Lasting Links

Award number:	9153862
Funding:	$399,891
PI:	Nancy Roberts
Co-PI:	Alan Dyson
Institution:	Lesley College, Cambridge, MA
Dates:	September 1, 1991–August 31, 1996

This project, which is an extension and elaboration of its current project, *Creating Communities of Inquiry*, has three components. First, each year, 80 elementary school teachers in the Boston and Cambridge, Massachusetts, area are given an opportunity to shadow practicing scientists in the private sector for 90 hours. This activity results in a jointly developed science activity for the classroom. Second, the project staff establishes electronic networks that permit electronic mail communication among the teachers' classrooms, industry scientists' laboratories, and possibly college and university laboratories. Third, bimonthly teleconferences among the teachers and their mentors are held to share experiences and ideas. This project reaches a total of 160 teachers.

Teachers, Time, and Transformation: A Grassroots Model for Reform in Practice and Curriculum

Award number:	9253322
Funding:	$796,470
PI:	Faye Ruopp
Institution:	Education Development Center, Newton, MA
Dates:	September 1, 1992–February 29, 1996

The aim of this project is to give 36 teachers (grades 4–12) in the Boston, Massachusetts, area the mathematical and pedagogical background to become teacher leaders. Using available, exemplary curricular materials in the teaching contexts called for by the NCTM standards, participating teachers explore algebra-related topics that cross grade levels. Materials include cooperative peer learning, use of hands-on materials, and applications of computers and calculators. Participants also attend 18 half-day workshops during the academic year. Local businesses cooperating with the project provide substitute teachers free of charge to the schools. These volunteer employees discuss with students how mathematics is used in the work place and, in turn, gain an appreciation of the day-to-day problems of the schools.

During the summer, the teacher participants continue their studies in an intensive 2-week workshop. In the second year, the participating teachers develop and begin to implement new lessons relating to algebra in their own classrooms. Project staff provide close support and mentoring throughout the year. The lessons developed are then integrated into a coherent program of algebra for grades 4–12 called *Algebra for Everyone*. The program concludes with a dissemination conference at which the materials, lessons, and experiences of the program are made available on a national basis.

Teaching to the Big Ideas

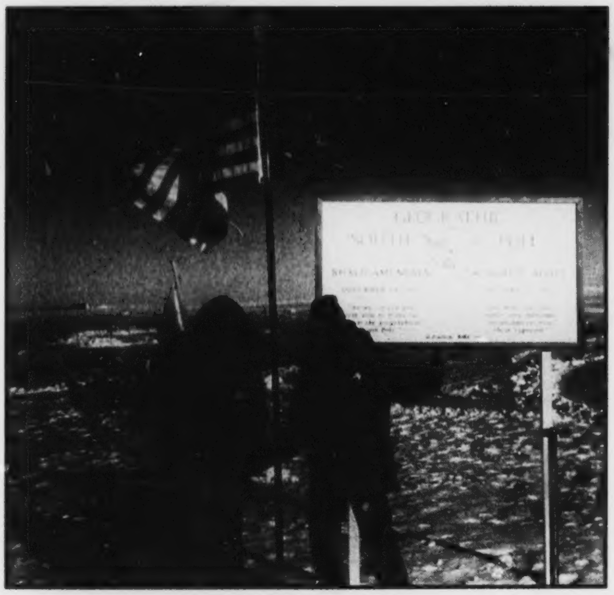
Award number: 9254393
Funding: $1,819,379
PI: Deborah Schifter
Co-PIs: Susan J. Russell, Virginia Bastable
Institution: Education Development Center, South Hadley, MA
Dates: August 1, 1993–November 30, 1996

This project for 36 elementary teachers is a collaboration between the Education Development Center, the Technical Education Research Center, and Mount Holyoke College. Each year of the program consists of a 2-week summer institute, followed by biweekly after-school meetings and biweekly class visitations by project staff during the school year. Teachers and project staff focus on identifying and exploring the underlying organizing principles with which their students must wrestle as their understanding of mathematics grows. The project also focuses on training the participants to become teacher leaders who can successfully share their insights and skills to help other teachers change. Participants are working with the project staff to produce written materials for schoolwide and districtwide dissemination with the cooperation of administrators.

Misconception Videos Project (MVP)

Award number: 9155229
Funding: $1,165,536
PI: Irwin I. Shapiro
Institution: Harvard University, Cambridge, MA
Dates: July 1, 1992–December 31, 1995

Harvard University Observatory has developed teacher training videos and workshop materials that help science teachers understand and cope with misconceptions in science. Six 28-minute tapes address misconceptions in the fields of biology, chemistry, earth science, engineering, mathematics, and physics. An additional set of six 30-minute workshop tapes contains sample student and teacher interviews and samples of both effective and ineffective teaching methods accompanied by activity books. A panel of six teachers with a background in misconception research serve in summer workshops as an advisory group in the development of the materials. The videotape series and workshop materials are derived from the work pioneered in *Project Star*; the tapes are an extension of the pilot video, *A Private Universe*. Cost-sharing is 37 percent of the NSF award.



Support Program for Instructional Competency in Astronomy (Project SPICA)

Award number: 9155400
Funding: $819,066
PI: Irwin I. Shapiro
Co-PI: Darrel B. Hoff
Institution: Harvard University, Cambridge, MA
Dates: July 1, 1992–December 31, 1995

SPICA II is a continuation of *Project SPICA*, a project that promotes the use of hands-on, activity-based science learning at all grade levels. The project, which is designed to increase the amount and quality of physical science being taught, relies on the attractiveness of astronomy to achieve its goals. Each summer 30 teachers participate in 3-week institutes where they become familiar with hands-on educational materials and learn related teaching methods. These teachers then become *SPICA* agents, presenting workshops that emphasize hands-on activities to other teachers in their home regions, districts, and states. Some of the teachers teach at the college level and develop and deliver in-service courses through university continuing education programs. In addition, a teacher's handbook of activities has been produced and made commercially available. Funds from the sales of the handbook are used to help finance the ongoing *SPICA* network.

Training Leadership Teachers to Enhance Science Education Through Experiments and Demonstrations (SEED)

Award number:	9253191
Funding:	$885,665
PI:	Michael B. Silevitch
Co-PIs:	Christos Zahopoulos, Alan Cromer
Institution:	Northeastern University, Boston, MA
Dates:	September 15, 1992–December 31, 1996

Project SEED, a 4-week summer workshop for middle school teachers, focuses on the use of inexpensive materials to teach the basic concepts and principles of physical science. The core of the project is a manual composed of more than 150 experiments and a kit of supporting demonstrations. In addition to workshop sessions, visits to local research and industrial facilities and talks by Northeastern University research faculty are included. Teachers who participate in *SEED* workshops also receive 2 years of leadership training (*PRO-SEED*) to prepare them to conduct in-service activity-based workshops in their own school districts. This after-school program of teachers-teaching-teachers is named *EX-SEED*. An additional component of the project is to train retired scientists to act as science resource agents within the schools (*RE-SEED*). This project is training a total of 48 leader teachers, 16 peer teachers, and 70 retired technical professionals. Additional features of the project involve the use of (1) live interactive telecasts distributed by Massachusetts Corporation for Educational Telecommunications satellite network to *EX-SEED* leaders and participants prior to each *EX-SEED* workshop and (2) museum-style corridor exhibits to be distributed within the schools for students. Cost-sharing is estimated at 85 percent of the NSF award.

Statewide Implementation Program (SIP)—A CESAME Extension: Dissemination and Implementation of Exemplary Science and Mathematics Programs in Massachusetts

Award number:	9355610
Funding:	$4,403,823
PI:	Michael B. Silevitch
Institution:	Northeastern University, Boston, MA
Dates:	April 1, 1994–September 30, 1998

The *Center for the Enhancement of Science and Mathematics Education* (*CESAME*) provides long-term support for the dissemination and implementation of exemplary curricular, teacher enhancement, and other science and mathematics education reform projects. The project involves the collaborative efforts of both teachers and administrators at each site. In the first pilot year, two schools participate in the project. Two additional school test sites are added in the second year, with three sites added per year in subsequent years. After a school has been a test site for 2 years, its program expands to include four demonstration schools associated with that site. Four demonstration sites join each of the first two pilot schools and then join each of the test sites. By the end of the project, there will be 10 test sites and 16 demonstrations sites. Those schools that began the project in the pilot year and their demonstration sites are sites of exemplary practice. Sites are added each year, even after NSF funding, until there are 13 test sites and 40 demonstration sites. Cost-sharing is 56 percent of the NSF award.

Habits of Mind: Science in Cambridge

Award number:	9355728
Funding:	$1,798,133
PI:	Sandra Spooner
Co-PI:	Melanie Barron
Institution:	Cambridge School Department, Cambridge, MA
Dates:	June 1, 1994–September 30, 1997

The Cambridge Public School System is establishing a comprehensive elementary and middle school science program, through the implementation of systemic, districtwide science staff development, reaching a total of 293 teachers. The activities prepare all the elementary and middle school teachers to teach hands-on, inquiry-based, thematic science units keyed to the Cambridge Science Framework. All secondary school teachers of grades 7–9 learn the content and instructional strategies of a thematic, interdisciplinary middle grade science program linking the middle and high school curricula. The methods to be employed to bring about such change include (1) training five science staff developers, (2) developing 28 lead classroom teachers in 14 elementary and middle schools, (3) establishing school-based science action teams, (4) collaborating with MIT, and (5) holding science awareness seminars for administrators. Staff development and technical assistance for the training activities are provided by Education Development Center, Technical Education Research Center, and a core scientists group representing local universities.

Patterns in Nature: A New Approach to Interdisciplinary Science

Award number:	9353500
Funding:	$1,474,542
PI:	H.E. Stanley
Co-PI:	Gerald L. Abegg
Institution:	Boston University, Boston, MA
Dates:	September 1, 1993–February 29, 1996

This project builds on earlier and concurrent projects to develop materials for students that incorporate the concepts of randomness in nature. Participating teachers, and ultimately students, are given the opportunity to discover and explore natural phenomena in much the same way a scientist would. Using existing units including random walks, accretion, and percolation, many activities are being developed that relate to each of the sciences. Examples include the growth of nerve cells, lightning strokes, termite tunnels, erosion gullies, tree roots, and forest growth. Lessons such as these can be included in existing courses or be combined to make a complete 1-year course on interdisciplinary science. An important aspect of this project is the reeducation of teachers to assume different roles. Teachers become guides, mentors, and coaches to students. Instead of the more traditional mathematics and rule-based science, the students build their

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understanding of processes and relationships through exploring natural phenomena. The project trains 32 teachers nationwide the first summer and two groups of 32 teachers each of the following two summers for a total of 160. From each group of 32, 10 teacher leaders are selected to assume additional roles and to help train additional teachers. The cost-sharing is 43 percent of the NSF award.

The 5C/5E Project: The Five College Education in the Earth's Environment, Ecology, and Energy Project

Award number:	9150262
Funding:	$878,350
PI:	Morton M. Sternheim
Co-PI:	Mary Alice B. Wilson
Institution:	Five Colleges, Inc., Amherst, MA
Dates:	March 1, 1992–August 31, 1995

This project offers middle school teachers who need scientific information skills in using low-cost equipment and supplies, realistic management strategies, and help in integrating recent pedagogical recommendations. Each of the two project cycles reaches 60 teachers who participate in a sequence of activities focused on the development of regional student research projects. The program includes (1) spring introductory workshops; (2) a 3-week summer institute during which teachers develop student research project plans using a regional sharing model; (3) an academic-year program including meetings, a newsletter, and electronic bulletin board network, student fairs and congresses, and staff support; (4) a 1-week summer institute to complete documentation and dissemination plans; and (5) continuing academic-year support for student research projects and for local, regional, and national dissemination. Cost-sharing is 23 percent of the NSF award.

Exploring the Microcosmos: Micro-life as a Dynamic Learning Tool in Middle and Secondary Classrooms

Award number:	9153826
Funding:	$1,129,126
PI:	Douglas Zook
Institution:	Boston University, Boston, MA
Dates:	April 1, 1992–September 30, 1995

This project in microbiology emphasizes training in hands-on activities for secondary level biology teachers. Teachers' training includes summer institutes, a series of local workshops, and outreach presentations. The summer institute offers 2-week workshops for 20 potential lead teachers each year. In addition, each year, 20 lead teachers selected from a pool of previous participants attend a 1-week institute to prepare them to conduct 1-week local workshops. These workshops are then presented by teams of two lead teachers during the following year. Lead teachers also serve as local resource teachers. Logistical support for these efforts is provided by a developing communications network and by development of local support centers. Over 1,000 teachers are participating in the 1- or 2-week workshops, and another 600 participants are being served in local outreach efforts of shorter duration. An amount equal to 32 percent of the NSF award is provided as cost-sharing.

Looking at Students' Interactions with Materials and Phenomena: A Collection of Video and Print Resources for Teachers

Award number:	9355612
Funding:	$595,665
PI:	Bernard Zubrowski
Institution:	Education Development Center, Newton, MA
Dates:	May 1, 1994–April 30, 1996

This project is developing and testing a series of video and print materials for teachers to understand the use of concrete materials and phenomena in middle school science education. The materials focus on developing teachers' skills in observing and supporting hands-on investigation and exploration. The videos provide documentary footage of the many ways in which students interact with a range of materials common in middle school physical science. Print resources provide a background for the videos. The project emphasizes research and evaluation to identify how the design and content of the materials can maximize the impact on teachers' understanding and practice and to determine how the materials are used by instructors in different settings. The project also explores strategies for distribution.

MICHIGAN

Operation Toolbox: A Program in Environmental and Behavioral Biology for Science Teachers

Award number:	9155256
Funding:	$478,094
PI:	Howard H. Hagerman
Co-PIs:	Glenn D. Berkheimer, Martin T. Hetherington, Dennis W. Fulbright
Institution:	Michigan State University, East Lansing, MI
Dates:	May 1, 1992–October 31, 1995

This project provides teacher enhancement in environmental and behavioral biology. Each year, 24 junior high school and high school biology teachers receive instruction that covers recent developments in environmental sustainability, agroecological practices, and the place of microbes in the environment. Instructional methods consist of lecture, discussion, guest speakers, and appropriate laboratory and field experiences. Lead teachers from previous workshops are part of the teaching faculty. Teams of middle school and high school teachers from the same district are encouraged to apply. Participants are shown ways of integrating economic, ethical, and political factors pertaining to environmental use into their curricula. Teacher teams develop laboratory or field experiences that are shared with all other participants. Participants are required to develop a unit plan based on a conceptual change model. Participants provide peer teachers 3 days of in-service workshops based on their summer and classroom experience. The summer workshop can be applied toward a Masters of Biology Teaching Degree. Cost-sharing is 8 percent of the NSF award.

Mr. Wizard TV Science Workshops

Award number:	9150246
Funding:	$3,812,760
PI:	Donald J. Herbert
Co-PI:	Dennis J. Harlan
Institution:	Mr. Wizard Foundation, Acampo, MI
Dates:	June 15, 1992–May 31, 1996

The Mr. Wizard Foundation in a collaborative effort with Nickelodeon Cable Television is producing and broadcasting 70 teacher workshops on elementary science education. These 15-minute programs feature exemplary hands-on science teaching and offer teachers and school administrators current information on teaching methods, instructional materials, and models for managing educational change. The programs are broadcast over cable television in the early morning hours for videotaping and later use. Teachers are supported through newsletters, teachers' guides, and a toll-free telephone support system to answer questions. This partnership reaches hundreds of thousands of teachers across the country and improves their understanding of effective science teaching. Cost-sharing provided by Nickelodeon amounts to 35 percent of the NSF award.

Mathematical Sciences Sequential Summer Institute for High School Mathematics Teachers

Award number:	9353513
Funding:	$1,211,152
PI:	Christian R. Hirsch
Co-PIs:	Yousef Alavi, Charlene Sheets
Institution:	Western Michigan University, Kalamazoo, MI
Dates:	June 15, 1994–November 30, 1997

This master's degree program for 30 well-prepared high school teachers (selected statewide) builds on a current State-supported project called *Making Mathematics Accessible to All*. The program consists of three sequential summers of mathematics courses in such areas as discrete mathematics, statistics and probability, dynamical systems, transformational geometry, matrix algebra, and others. All courses in the program stress applications and mathematical modeling, the uses of computers and graphing calculators, long-term projects requiring cooperative group efforts, and writing about mathematics. To complement the sequential summer program, in each of the three academic years, participants take an additional course, including two mathematics education courses that focus on issues of curriculum, pedagogy, assessment, and the teacher as a thoughtful practitioner, researcher, and mentor. These year-long courses include six 2-day meetings on campus and a staff visit to each participant's school. More frequent interaction between participants and staff is facilitated by MichNet. Cost-sharing is 23 percent of the NSF award.

Teachers in Industry Strategy

Award number:	9153904
Funding:	$297,234
PI:	P. Douglas Kindschi
Co-PIs:	Mary Ann Sheline, David Tanis, William M. Witzel
Institution:	Grand Valley State University, Allendale, MI
Dates:	September 1, 1991–February 29, 1996

This project provides support each year for 20 teacher interns to work in local businesses and industry in science and technology positions. Using this experience, the teachers are expected to design for their students mathematics and science activities that reflect the themes of (1) relevant science, mathematics, and technology; (2) problem solving; (3) teamwork; (4) communication; and (5) motivation and quality. The teacher interns also team up with administrators from their school system to explore these same five themes in regular industry training sessions at industry sites. Drawing on this experience, the teacher/administrator teams design appropriate in-service activities for other educators in their own schools. The teachers are expected to carry out outreach activities and recruit their colleagues into the project. These workshops are run jointly by teacher interns and their industry partners and introduce educators to the world of industry through the eyes of industrial science and mathematics professionals. Cost-sharing from the university, local schools, and local business and industry is 124 percent of the NSF award.

Enhancing the Teaching of Project-Based Science

Award number: 9153759
Funding: $1,145,906
PI: Joseph S. Krajcik
Co-PIs: Phyllis Blumenfeld, Elliot M. Soloway, Ronald Marx
Institution: University of Michigan–Ann Arbor, Ann Arbor, MI
Dates: September 1, 1991–August 31, 1995

Project-based science improves science teaching and learning so students are more knowledgeable, thoughtful, and motivated to learn science. The project staff collaborate with upper elementary and middle school teachers to meld the theoretical and research-based knowledge of university faculty with the professional teaching knowledge of teachers. Half of the participating teachers are drawn from schools that service substantial numbers of low-income, minority, and high-risk groups. The project results in the development and dissemination of various enhancement materials for teachers who want to use project-based science instruction. The materials are expressed through a range of media from written documents to computer-based hypermedia that allows the teachers to search and use information to implement, modify, and generate projects.

Teachers' Learning from Reform: The Case of Mathematics Instruction in California

Award number: 9153834
Funding: $2,479,130
PI: Penelope L. Peterson
Co-PI: David K. Cohen
Institution: Michigan State University, East Lansing, MI
Dates: February 15, 1992–July 31, 1996

Michigan State University is conducting a study of teachers' learning from mathematics education reform in California. The study focuses on four reform elements: tests, texts, professional development, and the California Mathematics Framework. The professional development models being studied are six exemplary NSF-funded teacher enhancement projects. The study attempts to answer such questions as how teachers change and learn in response to current reform movements, what influences their learning, and how teachers' personal and professional biographies affect what they learn. In all, 102 elementary school teachers are being studied, 30 intensively.

In addition, a mail/telephone survey is being conducted with 800 California elementary teachers to investigate more broadly the influences of policy on teacher thinking and practice; to gather information on the understandings, ideas, and practices of a larger group of elementary teachers; and to contribute to the development of indicators useful to studying change. The survey also allows the observed teachers to serve as a representative sample of California teachers. From the study, case studies and evaluation instruments are being developed that contribute to innovations in teacher education, teacher change, and reform. This project has great potential for stimulating the construction, investigation, documentation, and refinement of effective approaches for teacher enhancement. Cost-sharing accounts for 12 percent of the NSF award.

Global Rivers Environmental Education Network (Project GREEN)—A Teacher Enhancement Program

Award number: 9253186
Funding: $1,350,128
PI: William B. Stapp
Co-PI: Orin G. Gelderloos
Institution: University of Michigan–Ann Arbor, Ann Arbor, MI
Dates: February 15, 1993–January 31, 1996

The University of Michigan is disseminating *Project Green* nationally. Teams from five regions (southeast, northeast, southwest, northwest, and midwest) are being selected and trained to be leaders. These regional teams are responsible for recruiting and training other middle and high school teacher teams in their area. The project builds on previous work using watersheds to create a science/social science interdisciplinary course at the secondary level. Cost-sharing for the project is 16 percent of the NSF award.

ASSIST: A Special Summer Institute for Science Teachers

Award number: 9055455
Funding: $557,113
PI: Mary Whitmore
Institution: University of Michigan–Ann Arbor, Ann Arbor, MI
Dates: July 1, 1991–June 30, 1995

In a summer institute for science teachers, elementary school teachers are teamed with middle and high school veteran teachers of a previous project. The summer program is characterized by flexibility and options to meet the various needs of veteran and new participants. During the first academic year, participants implement in their classrooms one or more of the units introduced during the summer session. During the second summer, secondary and elementary teacher teams work with their administrators to develop a program of professional development to be implemented in their schools. Project staff provide support and site visits during the first year of implementation. Formative and summative evaluations, a winter reunion, site visits by staff, and assessments when units are implemented—all are means by which the project's effectiveness will be evaluated. Cost-sharing is 11 percent of the NSF award.

MINNESOTA

Teachers Empowering Teachers: Vertically Integrated, Inquiry-Based Geometry in School Classrooms

Award number:	9355671
Funding:	$633,768
PI:	Richard J. Allen
Co-PIs:	Martha L. Wallace, Judith N. Cederberg, Dale G. Pearson
Institution:	Saint Olaf College, Northfield, MN
Dates:	May 1, 1994–April 30, 1998

This project involves 50 middle and high school teachers in two 4-week summer institutes to improve their skills and confidence in the teaching of geometry using hands-on materials and technology to promote student inquiry. The teachers participate as district teams with the purpose of creating scenarios that initiate vertically integrated geometry curricula changes in their districts. The project generates guidelines for teacher enhancement projects to create and sustain inquiry-based teaching of geometry-related topics in grades 6–12.

In the first summer, participants expand their knowledge of geometry, instructional skills using manipulatives and technology, and construction of inquiry-based scenarios. During the academic year, they establish networks and observe mentors and colleagues for learning and reflection. In the second summer, they expand their knowledge, learn to provide staff development, and begin vertically integrated curricula. During the second academic year, participants teach and revise their lessons/scenarios and provide staff development to their colleagues in the district. The participants move to establishing scenarios and units for use by their colleagues in their district and gain skills in staff development and school change to enhance district implementation. Districts contribute through collaborative planning opportunities, within and across buildings, and opportunities to work with colleagues on curriculum and classroom change. Cost-sharing is 33 percent of the NSF award.

Project "OPEN ACCESS"

Award number:	9355680
Funding:	$767,024
PI:	Thomas Berger
Institution:	University of Minnesota–Twin Cities, Minneapolis, MN
Dates:	August 1, 1994–July 31, 1997

This project is designed to provide teacher enhancement and leadership skills for 30 middle school and 30 high school mathematics teachers in using NSF-supported instructional mathematics materials in Minneapolis urban classrooms and neighboring districts. Specific instruction preparation is provided as the district completes instructional materials selection. The high school component focuses on the *Interactive Mathematics Project*, and the middle school component uses materials from several projects. Each year, a 3-week summer program on content, instruction techniques, and classroom assessment is held. Participants work with students two mornings each week of the summer program. Academic-year follow-up includes focused project-staff visits and support, along with 6 ½ days of sessions each year organized in time blocks appropriate to teacher needs. Cost-sharing is 33 percent of the NSF award.

Teacher Enhancement in Applied Ecology

Award number:	9055387
Funding:	$506,394
PI:	John E. Frey
Co-PI:	Bertha L. Proctor
Institution:	Mankato State University, Mankato, MN
Dates:	January 1, 1992–December 31, 1995

This project offers 5-week teacher enhancement summer institutes, followed by academic-year curriculum development activity. Seventy-two middle school science teachers (24 each year), from a six-state Midwest region, participate in summer research experiences and presentations in soil biology and agroecology. Teachers study organisms in soils, apply what they learn to issues in agroecology, and participate in writing, testing, and revising classroom materials. Laboratory materials are readily available to participant teachers and their students for in-class experimentation and study. Research projects undertaken by the participants are assigned for transport back to the home classroom to engage their students in the projects. Each teacher is required to provide in-service training for colleagues. Included are six week-long workshops conducted by two teacher teams at different locations within the region. At the workshops, at least 60 additional teachers are trained to conduct similar research activities with their students. Cost-sharing is 21 percent of the NSF award.

Science Teachers Discover Physics

Award number: 9155287
Funding: $268,238
PI: Naum Kipnis
Institution: Bakken Library and Museum of Electricity in Life, Minneapolis, MN
Dates: July 1, 1992–December 31, 1995

This project enhances 20 science teachers under-prepared in physics and physical sciences in grades 8–12. The project covers optics, acoustics, and electricity in a series of 5-week institutes, followed by a year of independent study by the teachers. Graduate credits are given from the University of Minnesota. The program is designed to increase hands-on experiments and to stress the investigative nature of the experiments through a historical approach. Students repeat famous discoveries with inexpensive copies of historical instruments and explore links among physics, mathematics, biology, and art. As a follow-up to the project, teachers continue to be supplied with instructional materials and samples of new instruments at their schools, and they receive a regular newsletter in which other teachers share information and experiences.

Project Activity-Centered Science (PACS)

Award number: 9150238
Funding: $1,128,919
PI: Geneva Middleton
Co-PIs: Richard C. Clark, Joseph L. Premo, Paul Olson
Institution: Minnesota Educational Cooperative Service Unit Association, Mankato, MN
Dates: January 15, 1992–June 30, 1995

This comprehensive plan delivers elementary science instruction to rural Minnesota schools. It is modeled on the Minnesota Public School System plan, which provides teachers with a hands-on, inquiry-based science curriculum and a centralized materials distribution network. Two teams of master teachers provide workshops at each of the Minnesota Educational Cooperative Service Units for 900 elementary and middle school teachers. Most of the participants in the program work as district trainers with their administrators to provide science education within their schools and/or districts. A number of the participants are regional trainers who function as science resource persons in their respective regions and who work with the district trainers to provide local in-services. Cost-sharing is 2 percent of the NSF award.

Pri-Math II: Developing Teacher Leaders to Foster Mathematics Talent in K–4 Students

Award number: 9254455
Funding: $953,936
PI: Mary Roberts
Institution: Intermediate District 287, Hennepin Technical College, Minneapolis, MN
Dates: July 15, 1993–December 31, 1997

Pri-Math II is designed to transform the NSF-funded, school-based *Pri-Math I* project into a district-level leadership model to improve mathematics education in the primary (K–4) grades. *Pri-Math II* works with school systems to develop individual, long-range improvement plans. Ten teams each including up to four (K–4) classroom teachers or specialists from *Pri-Math I* and a district-level administrator participate in the project and then select future project teams. The lead teachers and administrators directly involved reach 1,668 teachers indirectly by peer teaching. Project activities occur in four settings during each year: 4-week summer institutes, eight school-year seminars, four school-year visits to participant classrooms, and among participants, coaching peers and conducting in-service to articulate and implement systemwide plans. Mathematics content and pedagogy are integrated throughout, with summer mathematics courses in geometry/spatial sense, functions and proportionality, number systems and number sense, and data analysis.

The Five Senses

MISSISSIPPI

A Model for Secondary Teacher In-Service Science Instruction and Leadership Development

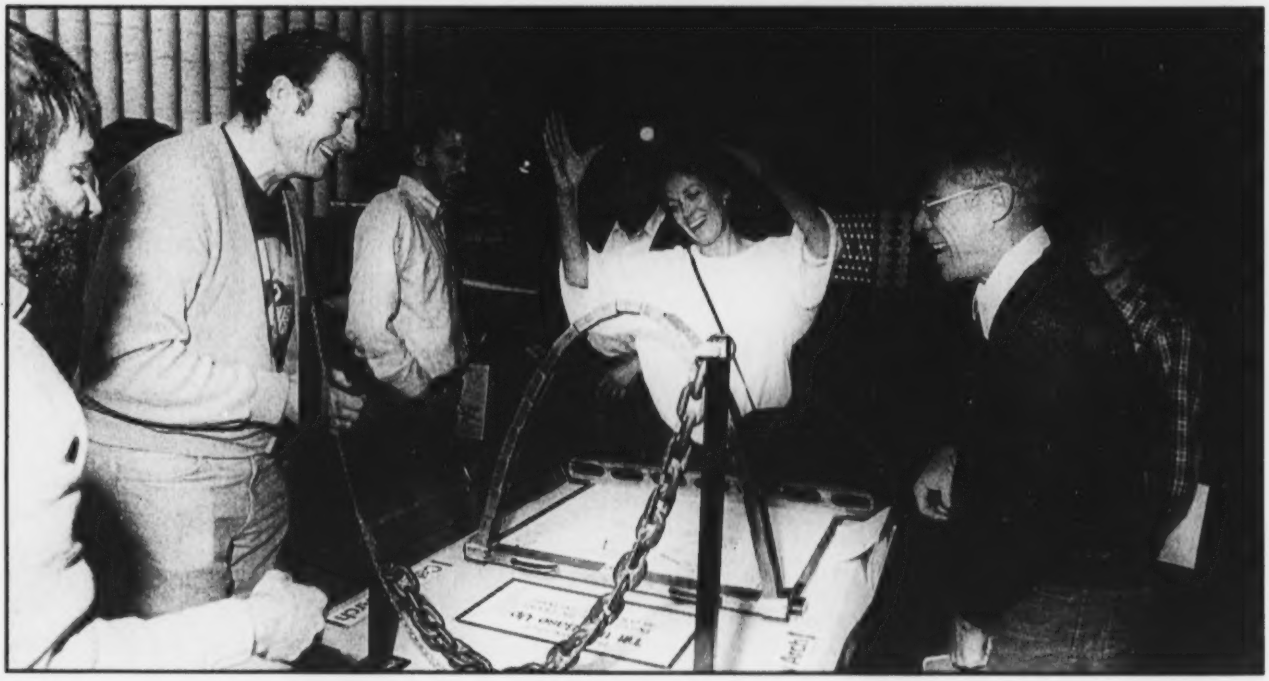
Award number:	9253249
Funding:	$719,257
PI:	John H. Bedenbaugh
Co-PI:	Angela O. Bedenbaugh
Institution:	University of Southern Mississippi, Hattiesburg, MS
Dates:	January 1, 1993–June 30, 1996

The Education Committee of the Mississippi section of the American Chemical Society in partnership with the University of Southern Mississippi provides in-service training to all Mississippi high school chemistry teachers. Fifteen topics are being developed, tested, and taught in a miniworkshop format. Each module is taught at eight places throughout the state, and each year three modules are covered. The in-service program is supported by a resource center, which provides telephone support, a lending library, and a newsletter. More than 400 teachers are being served. In the last year of the grant, the program will be tested in West Virginia to assess the possibility of dissemination. Cost-sharing from the university and the school districts is 44 percent of the NSF award.

Building Leadership to Enhance the Teaching of Secondary School Biology in Mississippi

Award number:	9253299
Funding:	$551,755
PI:	Rosalina V. Hairston
Co-PI:	Sabine Heinhorst
Institution:	University of Southern Mississippi, Hattiesburg, MS
Dates:	January 1, 1993–June 30, 1996

This project establishes a partnership of five universities, 15 community colleges, the State Department of Education, and school districts from throughout the state of Mississippi to improve high school biology education. The specific objectives of the project are to help teachers (1) integrate the processes of science skills to the teaching of biology concepts, (2) build students' conceptual understanding of biology rather than the recall of isolated facts, (3) acquire laboratory and field skills appropriate for teaching these contemporary topics, and (4) develop strategies to teach decision making on biological and controversial issues. To accomplish this goal, 10 five-member teams from throughout the State (three high school teachers and two community college instructors per team) are prepared as master teachers at two summer institutes in the content areas of molecular biology, genetics, and evolution. The teams collaborate with the State Department of Education in the revision of the high school biology curriculum and conduct 52 hour-long workshops at local sites throughout the State; these workshops update an additional 470 high school biology teachers in the content area and appropriate pedagogy. An equipment-lending program supports the equipment needs of the teachers in the implementation of new laboratory explorations. Cost-sharing equals 52 percent of the NSF award.



MISSOURI

Enhancing the Teacher's Role in Assessment (EXTRA)

Award number:	9353420
Funding:	$1,072,583
PI:	Shirley Hill
Co-PI:	Vena M. Long
Institution:	University of Missouri–Kansas City, Kansas City, MO
Dates:	June 1, 1994–October 31, 1996

The School of Education of the University of Missouri–Kansas City, in collaboration with the Coalition for Missouri Mathematics, the Missouri Council of Teachers of Mathematics, the Missouri Department of Education, the University of Missouri Video Network, the Mid-Continent Regional Educational Laboratory, and six school districts, is aiming to make mathematics teachers (grades 7–12) knowledgeable about and skillful in the uses of modern assessment practices. Forty teachers from six ethnically diverse school districts are selected to participate in a professional development program consisting of two sequential academic-year institutes and summer workshops. Communication between participants and staff is facilitated by a statewide fiber optic communication network. An outreach program begins in the second summer, when the original 40 participants begin to help project staff run institutes for 120 teachers around the State. The outreach program relies heavily on telecommunications. By the third year, 200 teachers around the state should be implementing modern assessment practices in their classrooms. The project organizes working groups of mathematics educators from around the state to produce and disseminate a handbook and a television course on modern assessment in mathematics. From its beginning, the project is represented by both participants and staff on the state's new testing committee.

Biotechnology Advocacy and Science Education (BASE) Program in Teacher Enhancement for Grades 6–8

Award number:	9155299
Funding:	$956,535
PI:	Paul S. Markovits
Co-PIs:	Georgia Archibald, Don Mitchell
Institution:	Cooperating School District of St. Louis, St. Louis, MO
Dates:	September 15, 1992–February 29, 1996

This project describes a collaboration between an educational consortium, school districts, universities, and local industry to provide instruction and ongoing support in the use of introductory biotechnology classroom materials to St. Louis City and County teachers of grades 6–8. Key components of the plan include the training of 96 lead teachers (CADRE teams), who have extensive presentation skills for adult instruction, and the use of a telecommunications network. These classroom teachers meet at different sites—in groups of about 20 per site—for instruction through telecommunication and on-site support from CADRE teams. Six hundred additional teachers participate in the project through the telecommunications network. Cost-sharing is 60 percent of the NSF award.

MONTANA

Missouri River Water Quality Network

Award number:	9155164
Funding:	$641,988
PI:	Gil R. Alexander
Co-PIs:	John R. Amend, Robert D. Briggs
Institution:	Canyon Ferry Limnological Institute, Inc., Helena, MT
Dates:	June 15, 1992–November 30, 1995

The Canyon Ferry Limnological Institute, Montana Office of Public Instruction, and Montana State University are offering a 4-week summer training workshop in aquatic ecology for teachers who live along the Missouri River. This project introduces teachers to the process of scientific investigation through a multiyear limnological study of the Missouri River. A network of more than 100 teachers along the river from Montana to St. Louis is being developed to involve 10,000 students per year in simultaneous sampling and assessing the river's water quality. Over the life of the project, 150 teachers and 50,000 students are participating in the project. Cost-sharing is 32 percent of the NSF award.

Chemistry Concept Workshops

Award number:	9254603
Funding:	$133,223
PI:	Arnold Craig
Institution:	Montana State University, Bozeman, MT
Dates:	July 1, 1993–April 30, 1997

The project involves 60 percent of the 200 Montana chemistry teachers in a series of intensive concept workshops. The concepts to be studied are determined by looking at the performance of the students on the ACS Chemistry Olympiad Examination items and coupling this with the teachers' expectations. Thirty lead teachers study topics in depth at Montana State during two week-long workshops in each summer. These teachers then hold regional workshops for teachers in their areas (at least 30 per year) over the course of the next academic year. At each of these regional workshops, a faculty member from the main campus assists in the teaching. The workshops are highly interactive, using the best of modern pedagogy to teach the students in the coming year. The cost-share is 26 percent of the awarded NSF funds.

FINEST: Field-based Instruction for Native American Elementary Teachers

Award number:	9253192
Funding:	$709,441
PI:	Robert R. Madsen
Co-PI:	Jeffrey S. Hooker
Institution:	Little Big Horn College, Crow Agency, MT
Dates:	February 15, 1993–July 31, 1996

This project is being conducted through tribally owned Little Big Horn College and on-site at the Crow and Northern Cheyenne Reservations in Montana. It is designed to provide quality training for elementary science teachers in the discovery method of teaching science. Project staff work directly with the elementary teachers in the classrooms to implement the discovery approach. Summer institutes are held for residential training in field-based science, providing opportunities to incorporate the traditional relationship of the people to the land. Cost-sharing is 18 percent of the NSF award.

Conservation Biology Workshop

Award number:	9055349
Funding:	$306,159
PI:	Lee H. Metzgar
Co-PI:	Scott M. Lewis
Institution:	University of Montana, Missoula, MT
Dates:	February 1, 1992–July 31, 1995

This project includes a summer workshop offering secondary science and mathematics teachers an integrated program of biology, mathematics, and curriculum change; this program is centered on a conservation biology theme. Approximately equal numbers of mathematics and science teacher participants are selected from a nationwide pool, though preference is given to teachers from the Northwest region of the United States or to teams of mathematics and science teachers from the same school or school district.

During the course of the program, two overlapping workshops (26 teachers in each, beginning in consecutive summers) are being conducted. Each workshop takes place over two summers and includes a 4-week residential summer workshop, an interim academic year, and a 1-week residential session the following summer. The first summer session combines fieldwork, laboratories, seminars, and lectures in biology, mathematics, and curriculum development. During the intervening year, participants test program changes in their home institutions while interacting with fellow participants and faculty through a computer network. The final 1-week session, during the second summer, provides opportunities for participants to share successes and difficulties, develop future plans, and reinforce the participants' commitment to curriculum development. Cost-sharing is 13 percent of the NSF award.

Blackfeet Mathematics and Science Education Improvement Project

Award number:	9153850
Funding:	$314,522
PI:	Gerard Vandeberg
Institution:	Blackfeet Community College (BCC), Browning, MT
Dates:	September 1, 1991–February 29, 1996

This project improves the quality of mathematics and science education on the Blackfeet Indian Reservation through a multifaceted program: (1) a 2-day reservationwide conference; (2) four intensive 2-week summer workshops; (3) eight 1- to 2-day workshops during the regular academic year; and (4) the piloting of a Mathematics and Science Associate Degree program involving 10 Blackfeet students.

The reservationwide conference includes education policymakers such as school board members and district administrators, Bureau of Indian Affairs and Indian Health Service officials, Tribal Elders, Montana State University personnel, and officials from the Office of Public Instruction; nationally known Indian educators and scientists; and local teachers, parents, and students. The focus is on the current state of mathematics and science education on the Blackfeet Reservations. The summer workshops study new methods for improving mathematics and science education among American Indian students and adaptation of activities to the Blackfeet culture for 16 teachers, 10 BCC students, and interested community members. The academic-year workshops acquaint 20 educators with nationally known mathematics and science curriculum projects—their content and pedagogy. An unusual feature of the project is having Blackfeet students mentor practicing teachers to provide a cultural background for teachers. Mentoring for mathematics and science content in the other direction provides science/cultural balance in a meaningful way. Cost-sharing equals 37 percent of the NSF award.

A National Science Teachers Network

Award number:	9253286
Funding:	$1,412,579
PI:	Gerald F. Wheeler
Co-PI:	Kimberly O. Obbink
Institution:	Montana State University, Bozeman, MT
Dates:	March 1, 1993–August 31, 1996

This project provides an opportunity for 150 teachers, through an online computer network, to take six courses selected from a prior successful NSF program. These courses have been revised to conform to the requirements of the new delivery and are revisited each year to increase their effectiveness. Teachers are provided a text, a study guide, and materials for hands-on activities. The matching funds provided by the university is 15 percent of the NSF award.

NEBRASKA

Nebraska Economics Fellows Institute for Secondary School Teachers

Award number:	9254386
Funding:	$745,584
PI:	James W. Marlin
Co-PIs:	William B. Walstad, James Dick
Institution:	University of Nebraska–Lincoln, Lincoln, NE
Dates:	May 1, 1993–October 31, 1996

The project brings together 35 outstanding teachers from Nebraska (Fellows) to pursue a master's degree in economics. The courses for the program are all regular catalog courses with special sections having restricted entry to only institute Fellows. Each of the Fellows is required to do a research project. The selection of the Fellows is based on regional considerations and population to ensure even dispersement to the several Economic Educational Centers strategically located throughout the State. Twenty-five of the Fellows are named as Center Associates and are required to set up other workshops and in-service projects for the teachers of economics in their region. Most, if not all, of the teachers of economics in Nebraska are expected to be affected by this institute through secondary effects. The cost-share is 22 percent of the amount being requested from NSF.

An Electronic Economics Tutor for Teachers

Award number:	9254411
Funding:	$1,843,392
PI:	James W. Marlin
Co-PIs:	William B. Walstad, Robert J. Highsmith
Institution:	University of Nebraska–Lincoln, Lincoln, NE
Dates:	June 1, 1993–November 30, 1996

This project incorporates exemplary curriculum materials in economics into a CD-ROM format to provide teachers with an extensive library of economics materials through interactive software. The project is disseminated through the National Council on Economic Education. Following the preparation of the CD-ROM materials, teachers from every state are involved in teacher enhancement programs to implement the curriculum in the schools.

High School Chemistry Teacher Demonstration Workshop: Fast-Track Skills Building for Underprepared Chemistry Teachers

Award number:	9253201
Funding:	$348,178
PI:	Bruce Mattson
Co-PIs:	Holly Harris, Mary A. Kubovy, Michael Anderson
Institution:	Creighton University, Omaha, NE
Dates:	December 1, 1992–May 31, 1997

This project offers 20 high school teachers of chemistry a program to provide content background and experience in the development of laboratory experiments and demonstrations. The teachers take a 2-week program in the summer and participate in follow-up activities during the subsequent academic year. This is followed by another 2-week summer session during which issues that emerged during the academic year are discussed. Three groups of 20 teachers are served by this program. Matching funds from the school districts and the university are 25 percent of the NSF award.

NEVADA

Mathematics and Science Enhancement

Award number:	9155239
Funding:	$2,319,889
PI:	P. Kay Carl
Co-PIs:	Linda Gregg, Keith Cochran, Lorraine Blume
Institution:	Clark County School District, Las Vegas, NV
Dates:	June 15, 1992–May 31, 1996

Clark County School District (CCSD) is the 9th largest school district in the country and includes rural, suburban, and inner-city schools. CCSD provides staff development for elementary teachers (72 in mathematics, 72 in science) and administrators to become leaders and agents of change. This systematic plan empowers educators and creates an opportunity for every K–6 grade student to learn science and mathematics. The participants are well-prepared teachers who are knowledgeable about content and conversant with current instructional strategies. The staff for the project include nationally recognized experts from the Lawrence Hall of Science (University of California–Berkeley), the Math Learning Center (Portland State University), the Center for Excellence in Mathematics Education (Western Washington University), and TERC. The materials to be adopted stress the use of manipulatives and hands-on learning and include *Math and the Mind's Eye*, *FOSS*, and *SAVI/SELPH*. The leadership component is patterned on the NSF-funded *California Mathematics Leadership Program*. In the third and fourth years of the program, the participants assume their leadership responsibilities by teaching in staff development centers throughout the school district and working with peer teachers in schools. Cost-sharing is 94 percent of the NSF award.

NEW HAMPSHIRE

Middle School Mathematics and Science Collaborative

Award number:	9055510
Funding:	$739,466
PI:	Judith A. Kull
Co-PI:	Sharon Oja
Institution:	University of New Hampshire–Durham, Durham, NH
Dates:	September 1, 1992–February 28, 1997

This project brings together the University of New Hampshire and four school communities to enhance middle school mathematics and science teachers' conceptual base, pedagogical skills, laboratory and activity learning, and scientific thinking. Twenty-four lead teachers from these four schools participate in three 3-week summer institutes, plus academic-year activities that include 10 days per year of in-service focusing on strengthening and practicing leadership skills.

As the project progresses, participants begin to provide in-service to colleagues within their own and neighboring schools and serve as master teachers to middle school mathematics and science teachers. A unique feature of this project is a week-long course that acquaints university mathematics and science faculty instructors, teacher education faculty, and the master teachers with interactive teaching methods, adolescent development, and discovery-oriented laboratory sessions and involves them in classroom observations and exchanges. Subsequently, these mathematics and science faculty instructors are extensively involved in the summer institutes and follow-up support of participants during the academic year. Cost-sharing is 29 percent of the NSF award.

Engineering Concepts for the High School Classroom

Award number:	9253171
Funding:	$418,360
PI:	Carol B. Muller
Co-PI:	John Collier
Institution:	Dartmouth College, Hanover, NH
Dates:	January 1, 1993–December 31, 1996

A 7-day workshop for 24 high school science (biology, chemistry, and physics) and mathematics teachers from across the nation provides first-hand experience of an unusual systematic instructional strategy that employs open-ended problem-solving techniques. The participants work in interdisciplinary teams of four to devise a product that addresses a problem or need in assigned fields, such as safety or energy conservation. Workshop participants are encouraged to call upon companies as they develop their solution and are encouraged to consider how to capitalize on the industrial interests and talent available. In addition, a team's solution to a problem is tested in its presentation to a review board.

In the second half of the workshop, participants are teamed with other teachers from the same discipline. The task is again problem-solving, with teachers working to develop curricular modules—for use in their high school classrooms—that incorporate the problem-solving techniques they have learned. Each participating teacher presents at least one in-service program in his or her home district during the year following participation in the workshop. Four teachers from the previous year return to the workshop to serve as master teachers. These teaching assistants develop a manual for dissemination and use in future workshops. Cost-sharing is 4 percent of the NSF award.

NEW JERSEY

Documenting and Understanding Young Children's Science Learning

Award number:	9155341
Funding:	$687,005
PI:	Ted A. Chittenden
Co-PIs:	Gita Z. Wilder, Jacqueline Jones
Institution:	Educational Testing Service, Princeton, NJ
Dates:	July 15, 1992–December 31, 1995

Students learn scientific concepts and acquire science process skills in different sequences and at different rates. Highly effective teaching requires an awareness of where a child is in the process of concept and skill development. This project combines research with teacher enhancement. Project staff and a cadre of experienced kindergarten and primary school teachers research two important questions: (1) Can systematic documentation of student speech, writing, and artwork add significantly to teacher effectiveness in science teaching? and (2) What training, materials, and institutional supports are needed to realize this added effectiveness?

In-class research, by the teachers and project leaders, leads to the development of prototypical protocols and materials for training teachers to use documentation in their teaching practices. The Educational Testing Service is developing these prototypes into marketable teacher enhancement tools to be disseminated in partnership with a publisher. This project is establishing an important new tool for science teaching in early childhood classrooms. The teacher enhancement materials from this research could have wide impact on teachers and schools. The Educational Testing Service is cost-sharing on this project by underwriting the costs of developing the prototype materials into marketable products.

Revitalizing Science Teaching Using Remote Sensing Technologies (RST) 2

Award number:	9355683
Funding:	$820,506
PI:	Angela Cristini
Institution:	Ramapo College of New Jersey, Mahwah, NJ
Dates:	June 15, 1994–November 30, 1997

This project works with 180 teachers and 30 supervisors from 90 schools in the New York and New Jersey areas. They learn to incorporate remote-sensing data and techniques into their science classrooms. The classes targeted are grades 4 and 5, and most topics specifically relate to earth science. Teachers receive instruction in the science and mathematics content needed to use real and timely data and to analyze images. The approach includes collegial teams with shared tasks. Communication among the teachers is encouraged, and teachers share their work and resources over the Internet. Cost-sharing is 13 percent of the NSF award.

Science Alliance 2

Award number:	9353520
Funding:	$1,519,131
PI:	George Daniel
Co-PIs:	Stephen W. Koontz, Mary Ribeiro
Institution:	Somerset/Hunterdon Business Education Partnership, Inc., Somerville, NJ
Dates:	September 1, 1993–February 28, 1998

Science Alliance 2 is the extension of a highly successful project called *Science Alliance*, an older, private-sector partnership project. The first project was a two-county alliance with 50 school districts. The new project, which involves four new counties, (1) recruits and trains local scientists/engineers and teachers; (2) pairs scientists, engineers, and teachers based on appropriate areas of expertise and interest; (3) develops industry, teacher, and student networks that bring practicing scientists and engineers into the classroom; (4) provides appropriate role models and gives teachers and students opportunities to hear about up-to-date science from those actually doing the work; (5) develops a program of science modules by teams of scientists, engineers, and teachers, complete with appropriate supplies, that focus on consumer-relevant issues, including technological advances in the physical sciences, environmental science, product chemistry, and product use biology, that teachers can use in the K–12 classroom; and (6) implements, expands, and disseminates the program through extensive teacher training by their peers in the modules developed in the section described above. Training the teachers to be lead teachers of their peers is critical to this project and has been successful in the previous project. The cost-share is 89 percent of the NSF award.

Enhancing Mathematics Instruction Through Computer-Oriented Active Learning Environments

Award number:	9253265
Funding:	$861,128
PI:	Edward Friedman
Institution:	Stevens Institute of Technology, Hoboken, NJ
Dates:	December 15, 1992–May 31, 1996

This project is offering a teacher enhancement program to provide intensive training and support during summer and academic-year workshops for 40 mentor teachers from 13 New Jersey school districts. Mentor teachers in turn provide in-service programs for more than 300 teachers in their local schools. The purpose of the project is to improve student achievement in pre-algebra and geometry in grades 7–10. The project uses state-of-the-art software as a catalyst for teacher change toward a more constructivist and active learning environment. The project is built on 4 years of research and development. Cost-share provided by the university and the schools is 61 percent of the NSF award.

Biology Institutes—National Science and Mathematics Leadership Program

Award number: 9155255
Funding: $1,616,668
PI: Dale S. Koepp
Institution: Woodrow Wilson National Fellowship Foundation, Princeton, NJ
Dates: May 1, 1992–June 30, 1995

This project offers a sequence of 4-week summer institutes in biology, together with dissemination and outreach activities. The institutes are devoted to such topic areas as bioethics, a comprehensive view of traditional and contemporary biotechnology, and middle school biology. The 4-week institutes include lectures, laboratory activities, modeling of teaching methods designed to involve students in their learning, extensive use of computer technology, and both small-group and individual projects. In the follow-up and outreach activities, materials written by the participants are field-tested in their own classrooms and reproduced for distribution to peers. Further dissemination occurs through week-long workshops conducted in subsequent years by teams of lead teachers selected from institute participants. Continuing contacts among the participants and the growing number of other classroom teachers included through the outreach projects are encouraged through a telecommunication network.

ASCI High School Teacher Summer Fellowship Program

Award number: 9355558
Funding: $360,094
PI: William Koopman
Institution: American Society for Clinical Investigation (ASCI), Thorofare, NJ
Dates: August 15, 1994–July 31, 1999

This project enhances U.S. high school science education, establishes new links between high schools and biomedical investigators, and attracts more students into scientific careers. High school science teachers are provided a stipend to work in the laboratory of an ASCI sponsor for 1 or 2 summers, during which they receive instruction in state-of-the-art techniques in the context of hands-on participation in a research project. Continued interaction throughout the school year with ASCI sponsors, accomplished physician-scientists who are excited about their work, is a central feature of the program.

In addition, teachers attend workshops directed toward translating the summer research experience into effective classroom activities and training teachers to become resources for their peers, especially minority teachers working in schools with primarily minority, disadvantaged, and underrepresented students. Applications are judged on the scientific merits of the proposal; the motivation, leadership skills, and qualifications of the teacher and the ASCI sponsor; the support of the high school administration for the program; and the effect that the teacher's participation might have on science education at the local level. Participants are required to write follow-up reports, and an external evaluation component has been established for ongoing evaluation of the program. The ASCI funded the program itself in 1991 and is committed to providing ongoing support. In addition to seeking NSF funding, the ASCI has secured and continues to seek funding from industry.

Development of Hands-On, Inquiry-Based Instruction in Secondary School Biology

Award number: 9155230
Funding: $559,040
PI: Roberta Moldow
Institution: Seton Hall University, South Orange, NJ
Dates: September 1, 1992–February 29, 1996

This project produces a cadre of 96 exemplary high school biology teachers for a cluster of urban minority school districts. Through a 4-week summer workshop, six Saturday sessions, and two classroom visits by university personnel, these teachers acquire (1) a strong knowledge and laboratory skills base in cell and molecular biology and in industrial and environmental microbiology, (2) an understanding of science process, (3) training in innovative instructional methods and curriculum design for teaching biology, and (4) a greater understanding of barriers faced by urban minority students who want to achieve in biology. Teachers are engaged in a guided research experience during the summer workshop and in their classrooms. They also develop and use new curricular materials that foster student interest in biological science careers and prepare students to pursue a college major leading toward such a career. The curricular materials are available for replication in other districts. Cost-sharing equals 11 percent of the NSF award.

Leadership Program in Discrete Mathematics—Phase II

Award number:	9155231
Funding:	$1,693,123
PI:	Joseph Rosenstein
Institution:	Rutgers University–New Brunswick, Piscataway, NJ
Dates:	March 15, 1992–August 31, 1995

Rutgers University is conducting a project to enhance 340 K–12 mathematics teachers in discrete mathematics and its applications. In addition, 3,400 second-wave teachers are receiving in-service from participants. Three cycles of teachers attend a 3-week summer institute, four follow-up sessions during the school year, and a second summer institute. One hundred fifteen teachers participate in each 2-year cycle. Twenty participants are selected each year to attend a 7-day leadership training program and are then expected to work in teams of two to provide four in-service workshops in their school districts the following year. Discrete mathematics topics include applications of graphs; graphs and algorithms; combinatorics, probability, and statistics; mathematical formulations and fairness; discrete dynamical systems; and iteration and fractals. Participants may earn up to six graduate credits.

This project is co-sponsored by the Center for Discrete Mathematics and Theoretical Computer Science, an NSF Science and Technology Center made up of a consortium of Rutgers and Princeton Universities, AT&T Bell Laboratories, and Bell Communications Research. This group is at the cutting edge of discrete mathematics, offering the excitement of prominent researchers in the field, many of whom are also excellent at communicating their mathematics to nonresearchers. Rutgers University, Montclair State College, Bellcore, and Bell Labs cost-sharing accounts for 28 percent of the NSF award.

NEW YORK

The Urban Environment as the Vehicle for Elementary School Science Teaching

Award number: 9055410
Funding: $718,111
PI: Gary Benenson
Co-PIs: James Neujahr, Alan Feigenberg
Institution: CUNY City College, New York, NY
Dates: January 1, 1992–November 30, 1995

Seventy-five New York City elementary school teachers from 15 schools are learning to develop materials from the urban environment as the vehicle for science teaching in their grades 4–6 classrooms. The project objectives are (1) to identify issues from the urban environment that lend themselves to elementary classroom learning, (2) to provide opportunities for teachers to use artifacts and issues from the children's immediate urban environment as the raw material for elementary science investigation, and (3) to demonstrate how the New York State Elementary Science requirements can be motivated using issues familiar and important to children. Participating schools remain part of the project for all 3 years, and the active involvement of administrators guarantees schoolwide dissemination. Cost-sharing is 78 percent of the NSF award.

Summer Seminars for Secondary School Teachers: Instruction in the Use of Zoological Collections in Teaching Science

Award number: 9055457
Funding: $309,973
PI: Annette Berkovits
Institution: New York Zoological Society, New York, NY
Dates: February 1, 1992–July 31, 1996

This project provides a 1-week seminar each summer at the Bronx Zoo for secondary science teachers. The purpose of the program is to stimulate teachers' creativity, improve their instructional skills, and give them proficiency in the use of wildlife exhibits to motivate students to study science. The seminars are based on the Bronx Zoo's award-winning, NSF-supported curriculum, *Survival Strategies*, that has been recognized as an effective program by the U.S. Department of Education, the New York State Department of Education, and the Johns Hopkins University Center for Research on Effective Schooling for Disadvantaged Students. Each summer, an intensive 5-day seminar accommodates 35 science teachers of grades 7–11, selected from secondary schools throughout the United States. Following completion of the seminar, each participant teacher offers in-service training for other science teachers from his or her local area.

SYEFEST: Schoolyard Ecology for Elementary School Teachers

Award number: 9353362
Funding: $733,056
PI: Alan R. Berkowitz
Co-PI: Kathleen Hogan
Institution: Institute of Ecosystem Studies, Millbrook, NY
Dates: February 1, 1994–July 31, 1996

Focusing on outdoor biology instruction, this project sponsored in partnership with the New York Botanical Garden Institution develops outdoor ecological activities, develops and pilot tests a professional development system for training teachers to use the activities, and evaluates the activities and training system. Fifteen teams (one teacher and one ecologist per team) from around the country develop activities appropriate for their setting (urban, suburban, or rural) and climate. These teams also serve as *SYEFEST* trainers for 10 teachers at each site. The Ecological Society of America disseminates the model and manuals. Materials used include Feinsinger and review of Outdoor Biology Instructional Strategies; some may come from *EcoInquiry*. Cost-sharing is 13 percent of the support from NSF.

In-Service Teacher Enhancement Program in Biology

Award number: 9155318
Funding: $226,261
PI: Pierre-Yves Bouthyette
Co-PI: Leonard Simons
Institution: Elmira College, Elmira, NY
Dates: January 15, 1993–December 31, 1996

This project enhances the teaching of 75 secondary biology teachers from six counties in the state of New York. Enhancement is being accomplished through three 3-week summer institutes and by follow-up support services offered during the following academic years. The program emphasizes an experimental, multidisciplinary, hands-on approach to the teaching of secondary biology using cooperative learning. Four content areas, including biochemistry, human physiology, molecular biology, and immunology, are covered in each summer institute. The primary objectives of the program include curriculum enhancement and ties to scientific disciplines, development of a more experimental outlook on biology, and increased creativity skills. Project staff monitor implementation progress during the academic year and are available to assist participants in this phase of the project. Cost-sharing equals 18 percent of the NSF award.

ACTION PHYSICS: Science and Mathematics Education Through the Physics of Movement

Award number: 9155335
Funding: $481,488
PI: Bonnie Brownstein
Co-PI: Brian B. Schwartz
Institution: CUNY Graduate School University Center, New York, NY
Dates: July 15, 1992–June 30, 1996

This project is a cooperative effort of the Center for Advanced Study in Education (CUNY), Brooklyn College, CUNY Physics Department, the New York City Board of Education, the New York State Education and Research Network (NYSERnet), the American Physical Society, the New York Academy of Sciences, and the Institute for Schools of the Future. *ACTION PHYSICS* is intended to train 60 New York City middle school teachers in basic physics concepts. The training involves teachers in the development and implementation of a series of activities that use sports, dance, and body movement as the experimental context for learning. The project strengthens teachers' abilities to use various teaching strategies to present physics concepts in this motivating framework.

Participants receive graduate credit for some of the coursework taken and have access to computers in the classrooms. They are also eligible for a New York City program that loans computers to teachers to use in their homes. Access to the computers enables the teachers to participate in electronic networking among themselves and with scientists associated with the project and with related groups and persons who use the NYSERnet and the Internet.

Science in the SEAMLESS Day: An Interdisciplinary, Urban, Multicultural Enhancement Program for Elementary School Teachers

Award number: 9253279
Funding: $1,889,734
PI: Arthur H. Camins
Co-PIs: Heidi D. Ludwig, Paul Jablon
Institution: New York City Board of Education, Brooklyn, NY
Dates: November 15, 1992–February 29, 1996

The New York City Board of Education in collaboration with Community School District 18 and Brooklyn College are training more than half of the 1,000 teachers in the 25 elementary schools in these districts in constructivist inquiry-based approaches to interdisciplinary science teaching. These school districts are in Brooklyn and include Bedford-Stuyvesant and other high minority and low-income areas.

The intent of this comprehensive, districtwide effort is to create a "seamless" day in which science forms an integral part of instruction in all subject areas. Education and science faculty from Brooklyn College act as resources in the project, and staff trainers from Lawrence Hall of Science and other curriculum developers instruct teacher trainers in several exemplary hands-on curricula. Teachers, principals, and school administrators receive hands-on training while exemplary teachers receive additional training that prepares them to act as mentors for pre-service teachers from Brooklyn College.

The project includes several other extensions, such as a summer science camp, a materials support center, and supervisory training. Science becomes a vehicle for teaching reading, language arts, music, social studies, and all other subjects. Mathematics instruction uses data gathered by the students during their science activities, thereby reinforcing the relationships among subject areas. This integration of subject areas is modeled through an internship program for teachers in training at Brooklyn College, making this a systemic and potentially permanent reform in science teaching in Brooklyn. Cost-sharing is 63 percent of the NSF award.

A Regional Teacher Enhancement Program for High School Teachers of Chemistry at the 13th Biennial Conference on Chemical Education

Award number: 9353403
Funding: $195,870
PI: Glenn A. Crosby
Co-PI: Jane L. Crosby
Institution: Division of Chemical Education Inc., New Rochelle, NY
Dates: August 15, 1993–January 31, 1997

This project provides workshops for 100 teachers in the Lewisburg, Pennsylvania, area in conjunction with the 13th Biennial Conference on Chemical Education. The teachers are provided special workshops concerning the latest techniques in laboratory and demonstration activities and then participate in follow-up workshops to ensure that new materials and techniques are implemented in the classroom.

A Collaborative Approach to Improving Science Instruction Through Technology in Grades 7–9

Award number: 9153910
Funding: $338,326
PI: Vincent Cusimano
Institution: New York City Board of Education, Brooklyn, NY
Dates: September 1, 1991–February 29, 1996

This project has two broad educational goals: (1) to improve problem-solving and communication skills in 7th through 9th grade students and (2) to improve the skills of pre-service and in-service teachers in integrating technology into the curriculum. Activities intended to lead to the realization of these goals include development of microcomputer-based laboratory and teleconferencing in 10 area schools, site visits and teleconferences for teacher enhancement, training of five college classes in use of project materials and involvement in teleconferences with the school sites, and a conference to develop and implement an action plan for the improvement of science instruction at all grade levels.

Science for the Handicapped

Award number:	9055527
Funding:	$482,151
PI:	Rodney L. Doran
Co-PI:	John Cawley
Institution:	SUNY at Buffalo, Buffalo, NY
Dates:	September 1, 1991–August 31, 1995

This proposal provides training to enhance the teaching capabilities of two different groups of teachers, one with a background in science and the other with a background in the education of mildly handicapped children. The participants are middle school and junior high certified teachers of science or special education who teach science to children classified as learning disabled or emotionally disturbed. The project includes two waves of 24 trainees in a summer program with follow-up sessions during the academic year. Sixty percent of the sessions are devoted to content and the remainder to teaching methods and clinical experiences with handicapped children.

In summary, the project has potential for increasing the teaching effectiveness of middle school and junior high teachers in science to children with learning disabilities. Cost-sharing equals 11 percent of the NSF award.

Project TEAM (Teacher Education at the Museum)

Award number:	9055474
Funding:	$378,075
PI:	Peter Dow
Institution:	Buffalo Society of Natural Sciences, Buffalo, NY
Dates:	July 1, 1991–September 30, 1996

This innovative leadership project is a collaboration between the Buffalo Society of Natural Sciences (including both education and curatorial/science staff persons), the Buffalo Public Schools, and individuals from local colleges and universities. This project trains 150 mentor teachers (30 teachers each year) and their principals in investigative, hands-on science. Project participants then train the remaining 1,100 elementary teachers in the Buffalo Public School System. The training includes two 5-week summer sessions (in a magnet school that is physically incorporated into the Buffalo Museum of Science) and four in-service workshops during the academic years. The setting of the project is enhanced by a science and mathematics magnet school housed within the museum, and by the school/museum's location in a largely inner-city environment with easy access to minority persons. The project is designed to provide mentor teachers with a strong science background in pedagogy and content, and to prepare and support these mentors as they in-service their colleagues. Project staff from the museum, the public schools, and the academic community provide strong support through academic-year workshops, site visits, and telecommunications networking. Principals are appropriately involved and work with mentors to develop a science in-service program tailored to meet the needs of their individual schools. Cost-sharing is 27 percent of the NSF award.

School-Based Elementary Science Restructuring Program

Award number:	9155338
Funding:	$3,142,441
PI:	Lauren D. Farber
Co-PIs:	Hubert M. Dyasi, Conrad Fernandez
Institution:	Community School District 6, New York School System, New York, NY
Dates:	July 15, 1992–June 30, 1997

Community School District 6 in New York, which extends across Manhattan, has a total enrollment of 23,000 students in grades K–8 with an 85 percent Hispanic student population, of which 40 percent have limited English proficiency. Almost 95 percent of the students qualify for the free lunch program. This comprehensive plan trains the district's teachers in a recently adopted hands-on, inquiry-based science curriculum.

One lead teacher per grade per school has already received training by district science coordinators. Leadership teams in each school are composed of three lead teachers, the principal, and the science assistant principal. The Workshop Centers of City College of New York and Educational Development Center provide training for the leadership teams in the hands-on curriculum. The lead teachers are released from their classrooms for three periods per week to provide training to the other teachers in their school. In total, 180 teachers receive training directly in workshop settings, and the remaining 600 have frequent in-class coaching and mentoring by their lead teacher colleagues. The training of school administrators assures a long-term change in the attitudes of school officials toward science instruction. The school district has demonstrated its commitment to exemplary science education in the past and has made firm commitments for future contributions. Cost-sharing by the school district represents 124 percent of the NSF award.

The Science Discovery Lab System: Sustained Enhancement for In-Service Teachers

Award number: 9355669
Funding: $723,488
PI: Alan J. Friedman
Co-PI: John Hammer
Institution: New York Hall of Science, Corona, NY
Dates: July 1, 1994–December 31, 1997

This project develops and institutionalizes the *Science Discovery Lab System*, providing training and ongoing support in astronomy education for New York City public and private 6th and 8th grade science teachers. This new system provides a model for addressing all mandated science curriculum areas. The project trains and supports teachers in several ways: a 3-week, graduate-level institute in content and pedagogy provided by college, university, and science center staff; peer training in schools and the science center; and tangible ongoing support, including annual update conferences, consultation, and provision of equipment. The goals are to increase teachers' knowledge of astronomy concepts, change teaching methodology from rote to hands-on, develop a citywide teacher support network to establish ongoing peer training, and institutionalize these improvements on a self-supporting, long-term basis. During the project, 120 teachers are trained, and they, in turn, train an additional 120 teacher colleagues. A total of 4,200 students will be reached.

Urban Mathematics, Science, and Technology Leadership Project

Award number: 9253272
Funding: $624,089
PI: Edward Goldman
Co-PIs: Joseph R. McPhee, Jan Hawkins, Frank Cibelli, Michele Gage
Institution: Brooklyn Tech Research Foundation Inc., Brooklyn, NY
Dates: May 1, 1993–October 31, 1996

Through this project, Brooklyn Technical High School and its partners provide summer and follow-up school in-service, and mentoring and leadership development experiences for 72 New York City high school teachers. These teachers become teacher leaders for many other teachers in hands-on uses of technology in science and mathematics. The teachers create appropriate lessons, devise strategies for incorporating them into the curriculum, and teach other teachers these techniques. The participating teachers learn to develop materials for their own classrooms based on what is currently used in the junior and senior pre-engineering curriculum at Brooklyn Technical High School. Science content with mathematics is emphasized, using cooperative problem-solving models with hands-on learning. Technology and computers are integral parts of the process.

Increasing Hands-On Elementary Science in the Classroom with the Use of Video Technology for Teacher In-Service

Award number: 9153838
Funding: $756,449
PI: William Halligan
Co-PIs: Carolyn S. Graham, Edward Lalor
Institution: New York State Education Department, Albany, NY
Dates: September 1, 1991–August 31, 1995

This project describes a joint effort between the New York State Education Department's Bureau of Science Education and Public Broadcasting Program and New York State's elementary science mentor teacher training network. Video-based, in-service materials are being designed and developed to present hands-on problem-solving to all elementary teachers, regardless of their ability to attend workshops. A secondary goal is to design and develop video-based materials to inform and motivate school administrators and parents to become actively involved in striving toward the long-range goal of creating a quality hands-on, elementary, problem-solving science program for their children. The established mentor network is used to train one teacher/mentor in each of the 1,000 public and nonpublic elementary schools in New York State. These 1,000 teacher mentors then train or make available the standalone video materials to the 80,000 elementary teachers in their buildings. Cost-sharing is 47 percent of the NSF award.

Enhancement of Analytic Thinking Through Advanced Economic Education in Secondary Schools

Award number: 9155187
Funding: $435,789
PI: Robert J. Highsmith
Institution: National Council on Economic Education, New York, NY
Dates: March 15, 1992–August 31, 1996

This project supports a nationwide teacher enhancement program whose objective is to prepare teachers to teach advanced placement economics in the high schools. The program takes place at four sites (University of California–Los Angeles; University of Minnesota; Purdue University; and Clemson University). Twenty-five well-prepared teachers are selected from each region to attend a 2_-day orientation session and a 3-week summer session. The teachers learn both content and instructional techniques and are also prepared to be teacher trainers so that the regional workshops can be replicated at local sites. Staff develop a teacher training manual for use in in-service activities, and teacher trainers carry out the in-services to disseminate the curriculum locally. The matching funds provided by the National Council on Economic Education is 122 percent of the NSF award.

Leadership in Middle Grade Mathematics: A Teacher Enhancement Program

Award number:	9155387
Funding:	$518,050
PI:	David Knee
Co-PIs:	Sharon Ayers, William J. McKeough
Institution:	Hofstra University, Hempstead, NY
Dates:	June 15, 1992–November 30, 1996

This project offers a coordinated collection of mathematics courses in content and pedagogy for 50 middle school teachers in the New York City–Long Island Metropolitan area. These courses take place in summer workshops and other follow-up and leadership activities during the following academic years. The project is designed to allow less well-prepared middle school teachers to enter the project starting in the second academic year. Modeling of effective teaching methods is a feature of all courses, as is the integration of the use of technology. Participants receive resource materials and computer software to use in their own classrooms. Cost-sharing from Hofstra University and participating school districts is 33 percent of the NSF award.

Teacher In-Service Program in Technological Literacy and Engineering Concepts

Award number:	9154839
Funding:	$464,784
PI:	Thomas Liao
Institution:	SUNY at Stony Brook, Stony Brook, NY
Dates:	April 1, 1992–December 31, 1995

This project prepares 40 science teachers, 40 technology/engineering teachers, 20 mathematics teachers, and 20 teacher leaders (in the same ratio) to become more technologically literate and able to implement contextual learning experiences in their high school mathematics, science, and engineering courses. The study of technological systems and related engineering concepts provides an approach to make science and mathematics more meaningful and attractive in high school education.

A tested and published *Principles of Engineering* syllabus for a 1-year course using six engineering case studies is used as the main curriculum material, supplemented by three video-based motivational and career exploration instructional packages. A teacher implementation and resource guide is being developed concurrent with the project.

Teacher participants and leadership teams from 16 states are an integral part of generating, critiquing, testing, and refining the resource guide. Project staff of mathematicians, scientists, technologists, and mathematics and science education specialists from SUNY–Stony Brook, and mathematics, science, and technology teachers from schools in New York produced the resource guide. In a 3-week summer workshop, 100 teachers from New York and five other states hear classroom presentations and participate in hands-on laboratory experiences that broaden their backgrounds in technology/engineering, applied physics, biology, and chemistry, as well as mathematical topics of algebra, trigonometry, geometry, and discrete mathematics. Both the university and school staff members facilitate these learning activities. Pedagogical features include (1) learning cooperative learning strategies and (2) developing a constructivist approach to helping students learn mathematics, science, and technology.

Five two-person leadership teams (one classroom teacher and one college, university, or regional educator consultant) join the summer workshop to finish the guide and evaluation input. The regional groups of participant teachers and leadership teams meet at the college/university of the consultant on the leadership team to conduct follow-up activities during the school year. Cost-sharing is 5 percent of the NSF award.

The Aerospace Science Leadership Institute

Award number:	9253270
Funding:	$675,654
PI:	Martin Marin
Institution:	CUNY City College, New York, NY
Dates:	January 1, 1993–June 30, 1996

In cooperation with New York Community School Districts 5, 8, 9, 11, 29, and 32, the City College of New York, CUNY, presents the *Aerospace Space Leadership Institute*. This project enhances the scientific skills of 48 middle school (grades 5–8) science teachers in New York City and focuses on training these teachers to become peer leaders in their districts. Using resources from Learning Link, the NASA Resource Center at City College, the Intrepid Air and Space Museum, and the Young Astronaut Program, CUNY provides participants with content, technology, and leadership skills that enable them to become effective educators of teachers equipped to help their colleagues integrate science and technology in their classrooms. Opportunities are provided for the development of aerospace science and interdisciplinary curriculum projects that are shared on the Learning Link electronic network. Cost-sharing is equivalent to 37 percent of the NSF award.

The WeatherWatch Leadership Network

Award number:	9353451
Funding:	$1,232,337
PI:	Martin Marin
Co-PI:	Dennis Weiss
Institution:	CUNY City College, New York, NY
Dates:	December 15, 1993–May 31, 1997

This project is designed to increase and improve the elementary and middle school teaching of weather in selected districts in New York City. The project emphasizes the development of teachers' capability to provide leadership to their peers, develop appropriate curriculum materials, and use a newly developed electronic linkage that brings weather data, weather maps, and satellite cloud imagery directly into the classroom. *WeatherWatch* provides participants with a summer institute; academic-year support through biweekly workshops and on-site demonstrations; access to a designated-space electronic bulletin board; opportunities to exchange and present local weather information, curriculum materials, and classroom projects through telecommunications; and in-service courses and dissemination conferences.

A Two-Piece Program to Develop and Support a Nationwide Corps of Human and Molecular Genetics Resource Teachers at the Secondary Level

Award number:	9254626
Funding:	$854,150
PI:	David A. Micklos
Co-PIs:	Mark V. Bloom, Robert Willis
Institution:	Cold Spring Harbor Laboratory Quantitative Biology, Cold Spring Harbor, NY
Dates:	April 1, 1993–September 30, 1996

Project staff from the DNA Learning Center at Cold Spring Harbor Laboratory are bringing instruction in human and molecular genetics to 216 pre-college advanced biology teachers in rural and nonurban areas of the western half of the United States and the upper Midwest regions. Three 5-day DNA science institutes (24 participants each) are being held with three follow-up workshops. In addition, leadership and advanced training is provided for a cadre of 72 human and molecular genetics resource teachers throughout the United States, who have already implemented model units on molecular genetics and have proven networking abilities.

This training consists of a 27-day leadership institute at Cold Spring Harbor and three 3-day regional follow-up conferences associated with regional National Association of Biology Teachers or National Science Teachers Association meetings. Cost-sharing is 35 percent of the NSF award.

Project ET: Energizing Teachers of Mathematics, Science, and Technology in Grades 4–9

Award number:	9253312
Funding:	$1,578,991
PI:	John Niman
Co-PI:	Jack A. Perna
Institution:	CUNY Hunter College, New York, NY
Dates:	September 15, 1992–February 29, 1996

Project ET is based on an equal partnership between Hunter College and Community School District (CSD). The project helps students in grades 4–9, particularly underrepresented groups, achieve their potential in mathematics, science, and technology. This is being accomplished through staff development for teachers, supervisors, and parents. Activities focus on teams of at least two teachers from each of the schools in CSD in workshops and computer-based activities for 15 days during the spring semester and 3 weeks in July at Hunter College.

By the end of the spring semester, each participant has a library that includes grade-appropriate curriculum materials, activities developed by the staff, computer disks, laser disks, model lessons, assessment instruments, and other educational resources. Field trips to local industry, environmental activities on the river, and an intensive 3-day camp experience at the Mohonk Mountain Reserve are included in the program and are designed to help teachers duplicate similar experiences with students at a later date. Participating teachers receive nine graduate credits in mathematics, science, and technology education upon successful completion of the project. Over the life of the project, 270 teachers, 32 supervisors, and 300 parents will participate, thus directly benefiting more than 17,500 students. Cost-sharing is 28 percent of the NSF award.

Supporting Middle School Learning Disabled Students in the Mainstream Mathematics Classroom

Award number:	9153812
Funding:	$662,722
PI:	Dana Packman
Co-PI:	Raffaella Borasi
Institution:	Norman Howard School Research Development and Outreach, Rochester, NY
Dates:	January 15, 1992–June 30, 1995

This project prepares 90 middle school mathematics teachers to respond to the needs of learning disabled students who are mainstreamed in regular mathematics classes. The project (1) develops alternative instructional strategies that support learning disabled students' mathematics learning and embed these strategies in field-tested exemplary geometry and algebra units, (2) implements three model teacher enhancement programs for middle school mathematics teachers from the Greater Rochester area, and (3) develops a package containing materials and suggestions to organize similar programs nationwide. In addition to the Norman Howard staff, nine core teachers from four middle school sites are responsible for developing and field-testing materials to be used in the enhancement phase of the project.

The mathematical focus of the project is introductory algebra and geometry, whereas the instructional focus is on construction of knowledge and use of manipulative and cooperative learning. Each teacher participant is part of one of three enhancement models: an intensive summer institute followed by year-long experiences involving classroom experimentation, a series of 10 workshops throughout the fall semester of the school year, or a series of 10 revised workshops through the spring semester of the school year. Cost-sharing from the Norman Howard School, University of Rochester, and participating school district is 32 percent of the NSF award.

Science Educators Enhancement and Development Program

Award number: 9155353
Funding: $376,600
PI: Stephen Pryor
Institution: SUNY College at Old Westbury, Old Westbury, NY
Dates: December 15, 1992–November 30, 1995

This project provides teacher enhancement to 150 elementary and secondary school teachers from Long Island, New York. The project has a strong minority focus and consists of five components: (1) 3-week summer institutes for elementary teachers and secondary biology teachers, (2) research experiences in biological sciences for secondary teachers, (3) videotaped exchange sessions between master teachers and less experienced teachers (both elementary and secondary), (4) seminars and workshops during the school year on issues in science and science teaching for secondary teachers, and (5) a teachers' network for science teachers in high minority school districts. Two institutes for secondary teachers address conceptual and pedagogical issues in neurobiology and local ecology and related environmental issues. The institute for elementary teachers provides basic knowledge in the natural sciences and introduces the method of conceptual change as a means of introducing scientific concepts into the elementary classroom. Cost-sharing equals 7 percent of the NSF award.

Applications and Modeling in the Secondary Mathematics Curriculum

Award number: 9253309
Funding: $367,489
PI: Theron Rockhill
Institution: SUNY College–Brockport, Brockport, NY
Dates: January 15, 1993–December 31, 1996

Integrating real-world applications and mathematical modeling into the secondary mathematics curriculum is the goal of this project. To these ends, 30 well-prepared high school mathematics teachers from around the State of New York participate in two successive summer, residential, 4-week institutes. In these institutes, participants (1) survey and examine available, exemplary classroom materials on applications and modeling; (2) study the underlying mathematical ideas and principles; (3) learn directly from industrial users of mathematics; and (4) explore appropriate uses of graphing calculators and microcomputers.

Participants are chosen in five teams of six—each team representing a region of New York State. During the first summer, in addition to their academic studies, these teams of teachers prepare their own lessons and units involving applications and modeling. They then pilot these lessons in their own classrooms during the succeeding academic year. The institutes also include staff development sessions to help prepare the participating teachers to conduct in-service workshops in their local schools throughout their respective regions. Support by project staff for all these activities includes at least two visits to each teacher's classroom, as well as to periodic regional meetings of the teams. Cost-sharing represents 58 percent of the NSF award.

Leadership Institutes to Promote Effective Computer Usage in Middle and Secondary School Laboratories

Award number: 9254390
Funding: $1,039,738
PI: Peter F. Seligmann
Co-PIs: Charles D. Spencer, Margaret Hendery
Institution: Ithaca College, Ithaca, NY
Dates: April 1, 1993–September 30, 1996

This project improves middle and secondary school physical science, biology, chemistry, and earth science instruction through training in microcomputer-based tools and modern pedagogies. Forty-nine master teachers from eight geographical areas in New York, Pennsylvania, and Georgia are trained through two 4-week summer institutes emphasizing materials development and conducting workshops. The teachers have access to previously developed materials and ongoing curriculum development support during the summers. The teacher leaders, in turn, conduct area workshops for 400 additional teachers and are available to offer ongoing assistance to the teachers. Cost-sharing is 35 percent of the NSF award.

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Statewide Training for Educators in Physical Sciences: STEPS K–12 Leadership Program

Award number:	9155348
Funding:	$295,029
PI:	Carl R. Stannard
Co-PIs:	Thomas P. O'Brien, Andrew J. Telesca
Institution:	SUNY–Binghamton, Binghamton, NY
Dates:	April 15, 1992–January 31, 1996

This project provides 2-week summer in-service training for teachers and teacher leaders in physical science of grades K–12 with most of the focus on pre-high school. The summer workshops train a cadre of teacher leaders in conducting workshops (20 per summer) and offer direct and indirect training in physical sciences to teachers. Local teachers are the recipients of the practice and demonstration workshops in the summer. Additionally, trained leaders are expected to run workshops in their own communities and return the following summer to share with the new group of leader trainers. The total impact is 60 trained leaders and 1,200 other recipients of the training. Through academic-year Saturday meetings, newsletters, a source book, and return meetings with new leaders, a substantial communication mechanism is established.

Mathematics Teacher/Researchers Collaborating for Collaboration in the Classroom (MTRC3)

Award number:	9253298
Funding:	$545,473
PI:	Patricia P. Tinto
Co-PIs:	Barbara A. Shelly, Nancy Zarach
Institution:	Syracuse University, Syracuse, NY
Dates:	December 15, 1992–May 31, 1997

This project aims at establishing a countywide network of secondary mathematics teachers whose ongoing work supports the teachers of Onondanga County (Syracuse, New York) as they introduce and maintain programs of modern mathematics in the county's high schools. Forty-two well-prepared mathematics teachers are selected for a project designed to strengthen their mathematical background, expand their pedagogical repertory, and enhance their leadership skills. The project begins with an initial group of 18 teachers (two from each of nine schools) attending a 4-week residential summer institute with two major foci: (1) helping teachers modernize their classroom instruction and (2) professionalizing teaching by asking teachers to reflect on their own classroom practices and their involvement in professional societies.

Participants study mathematical content—with emphasis on the importance of connections between diverse topics; solve (real-world) mathematical problems in small groups; explore the uses of technology to aid in doing mathematics; create lessons and units for use in their classrooms; and learn new and appropriate ways to assess student progress in mathematics. During the implementation phase in the ensuing academic year, project staff lend support to the participating teachers in a series of 12 half-day workshops. After additional training, participants from the first summer program act as mentors to the second group of 24 teachers. In the remaining years of the project, the entire group of participating teachers form teams of four to 14 members to initiate and maintain implementation and dissemination throughout their respective districts. Project staff provide a variety of support for these efforts. Cost-sharing is 30 percent of the NSF award.

MICROLAB Institute

Award number:	9155260
Funding:	$661,596
PI:	Martin Weiss
Institution:	New York Hall of Science, Corona, NY
Dates:	August 15, 1992–January 31, 1996

The New York Hall of Science is creating a *MICROLAB Institute* to provide training and ongoing support in microbiology education for 7th grade life science teachers and middle school science supervisors. Techniques include (1) training in content and pedagogy, (2) ongoing peer and instructional support, and (3) the continuing provision of all materials and equipment for successful classroom implementation of hands-on curricula. The major goals of the project are to increase teachers' knowledge of microbiology concepts, change teaching methodology from rote to interactive, develop a New York Citywide ongoing support network, and stimulate teachers' own continuing development of materials for activity-based learning. Two hundred teachers and 60 science supervisors serve as participants for this project. Cost-sharing is equivalent to 51 percent of the NSF award.

NORTH CAROLINA

Presidential Awardees in Communication Using the Internet

Award number: 9454186
Funding: $334,193
PI: George Brett
Institution: Microelectronics Center of North Carolina, Chapel Hill, NC
Dates: August 1, 1994–June 30, 1995

Through this pilot, a group of 30 teachers—Presidential Awardees—receive training on the basics of connectivity and accessing and sharing resources over the Internet. The project team learns the breadth and depth of training required, the type and extent of ongoing technical support needed, and the viability of using the Presidential Awardees as experts for other educators who have access to the Internet. The training is being held for 1 week and is drawing 30 teachers from the pool of 1994 Presidential Awardees in elementary and secondary mathematics and science. In addition to the formal workshop, support materials are being developed and tested to help teachers use SLIP accounts and networked services. Ongoing support is provided by Microelectronics Center of North Carolina and by teachers who participated in the earlier NSF-supported *Global Schoolhouse Project*. If it is feasible, the project may extend to supporting awardees who were not selected for the formal training. Cost-sharing is not specified, but the project does include contributions and expense sharing provided by the individual participants and by donations from companies such as AT&T.

Calculator Institute for Middle School Mathematics Teachers

Award number: 9153702
Funding: $284,510
PI: George W. Bright
Co-PI: William P. Love
Institution: University of North Carolina–Greensboro, Greensboro, NC
Dates: September 1, 1991–June 30, 1995

This project conducts workshop activities for 20 experienced middle school mathematics teachers to integrate calculator use into the mathematics classroom and curriculum. Participants design instructional materials that take advantage of calculators, and they prepare themselves as leaders for communicating their new knowledge to colleagues. Each teacher participates in a 6-week summer session and 6 to 9 days of follow-up activities during each year of the project.

Participants earn a total of 18 graduate credits that may be applied toward a masters degree in the School of Education. Topics to be studied include functions and graphing for middle school teachers, teaching of problem-solving, probability and statistics, research in mathematics education, and the use of advanced technology to teach mathematics. The project design also calls for the development of case histories that evoke the effects of the intervention in helping teachers learn to use calculators in teaching mathematics. Participants present workshops in their own school districts and through the Greensboro Area Mathematics and Science Education Center and the North Carolina Mathematics and Science Education Network. In all, more than 1,000 second-wave teachers and several parent groups are affected by the project. Cost-sharing by the University of North Carolina at Greensboro and local school districts accounts for 46 percent of the NSF award.

Contemporary Calculus and Precalculus Lead Teacher Development

Award number: 9253314
Funding: $886,889
PI: Dorothy Doyle
Co-PI: Jo Ann Lutz
Institution: North Carolina School of Science and Mathematics, Durham, NC
Dates: December 15, 1992–May 31, 1997

North Carolina School of Science and Mathematics (NCSSM) is offering a project to create a network of 25 pairs of high school lead teachers from across the nation to disseminate exemplary precalculus and calculus materials developed by the NCSSM faculty. The participants attend a series of residential summer workshops and return for progressively more advanced curricular work and leadership training over the course of three summers. During the school year, they are supported with an annual conference, a quarterly newsletter, and online conferencing. The teams also share the new concepts and materials with other teachers in their regions. Cost-sharing is 24 percent of the NSF award.

Reflecting on Our Work: NSF Teacher Enhancement, K–6

Award number: 9452859
Funding: $84,081
PI: Susan Friel
Institution: University of North Carolina–Chapel Hill, Chapel Hill, NC
Dates: August 15, 1994–July 31, 1996

Thirty-five experts in teacher enhancement (TE) and school change convene for 2½ days to review, critique, and synthesize what has been learned over the past several years of TE projects in K–6 mathematics. Conferees include principal investigators, former participants of TE projects, and—to broaden the perspective—several representatives from elementary science. Issues addressed by the conference include how best to effect teacher, school, and district change; how such change ultimately affects students; the resources (financial and human) available to effect systemic change; and assessment of the impact of TE programs. Proceedings of the conference will be published and will include five invited papers identifying major issues and a set of conference recommendations to help guide NSF's upcoming massive national teacher enhancement efforts.

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Team Science

Award number: 9254653
Funding: $759,542
PI: David G. Haase
Co-PIs: Alton J. Banks, John C. Park
Institution: North Carolina State University–Raleigh, Raleigh, NC
Dates: April 1, 1993–September 30, 1996

Team Science is directly aiding the school districts of northeastern North Carolina where there is a disproportionate share of rural, poor, and minority children. Thirty-two teachers from these counties are brought each year to North Carolina State University for a 4-week program that emphasizes hands-on learning through a mixture of low-tech, "homemade science" activities and high-tech microcomputer-based laboratory activities. The pedagogy emphasizes cooperative learning, station laboratories, and the integration of physics and chemistry. The teachers jointly plan and schedule their teaching programs for a van that visits their school at least once each semester during the academic year. This van is loaded with new physics and chemistry station laboratories and microcomputers and is driven by a master teacher who has worked with each of the participants during the summer.

The teachers are selected in teams of two, one for physics and one for chemistry, for this project. The Science House faculty maintains the equipment and provides other support over the year. During the year, the teachers meet at least four times to discuss their successes and problems. The teachers return to the university for a second summer session, building on the previous summer and the experience of the academic year. In addition, a new cohort of 32 teachers from new high schools are chosen and started in the project with a second van to visit their schools. A third cohort is chosen for the remaining life of the project. Cost-sharing is 12 percent of the NSF award.

Technology Tools for Science and Mathematics Learning

Award number: 9355706
Funding: $2,598,801
PI: Gerald W. Meisner
Co-PIs: Harol Hoffman, Brenda J. Woodruff, Edward A. Uprichard, Gary M. Grandon
Institution: University of North Carolina–Greensboro, Greensboro, NC
Dates: May 1, 1994–October 31, 1998

The University of North Carolina–Greensboro, in cooperation with nine other universities, provides summer workshops on the uses of technology and follow-up support for teachers from 20 school systems in the state. In collaboration with universities, other education agencies, and all state school systems, 230 in-service and 170 pre-service teachers are trained to use the current technologies that are available as tools to enhance science and mathematics learning. Teachers from 135 schools each participate in an enhancement program, meeting for 2 weeks each of two summers and for 12 additional days during the school year.

Topics include computer software, data probes, data storage, and telecomputing. Electronic mail and database support are provided for teachers through the state system known as NEWTON. The summer workshops are organized with the mornings dedicated to the teachers learning the tools and the afternoon to hands-on work with the technology. The staggered plan, the multiple settings, and the supporting communications technologies enable teachers to work with their peers throughout the school year. Cost-sharing is 109 percent of the NSF award.

Physics Courseware Evaluation Project (PCEP): Courseware Evaluation and PCEP Teacher Institute

Award number: 9253343
Funding: $1,141,514
PI: John Risley
Institution: North Carolina State University (NCSU)–Raleigh, Raleigh, NC
Dates: September 1, 1992–February 29, 1996

The goal of the project is to enhance the effectiveness of high school physics teachers' use of computers in the classroom and laboratory, for both instruction and computation. This goal is being accomplished through two distinct but interrelated activities: (1) the evaluation of physics software for the use of all physics teachers and (2) a Teacher Institute for empowering leadership teachers to use the software and achieve full computer use in teaching physics. The software evaluation component provides independent, timely, reliable, and comprehensive guides to currently available courseware for high school physics teachers. These reviews are being disseminated by publication in *The Physics Teacher* and by contributed presentations and local and national workshops.

The institute provides intensive hands-on activity in the use of the latest microcomputer-based laboratory interfaces, spreadsheets and sample exercises, and courseware materials for classroom demonstrations and student assignments. Each summer two 3-week sessions are organized with 12 leadership teachers in each. During the following year, staff members make two follow-up visits to the teachers' high schools and return to NCSU in the summer for 2 weeks of review and assessment. Forty-eight high school teachers are selected from around the nation to participate in this project.

During the first and second academic years, the leadership teachers are expected to conduct four workshops and give at least one presentation at a professional meeting on the use of computers to teach physics. It is expected that about 2,000 teachers are receiving information about using computers in physics instruction. Cost-sharing is equal to 17 percent of the NSF award.

North Carolina Leadership Network for Earth Science Teachers

Award number:	9355614
Funding:	$1,738,100
PI:	Russell J. Rowlett
Co-PIs:	Paul B. Hounshell, P. Geoffrey Feiss, Cynthia F. Copolo
Institution:	University of North Carolina–Chapel Hill, Chapel Hill, NC
Dates:	June 1, 1994–November 30, 1998

This project provides content enrichment, leadership training, network development, and on-site support to a cadre of earth science teachers in grades 6–12 from North Carolina. Subsequently, they introduce field-based observational projects into their earth science courses in conformity with the state curriculum. In six regions, 3-week summer institutes are conducted by master teachers and specifically trained earth scientists. During each of three summers, two institutes, each enrolling 25 teachers as two-member teams, are held at different regional sites. Supported by day-long premeeting workshops to devise site-specific needs assessments, postmeeting site visits by staff and earth scientists, follow-up meetings, and in-service development, the project prepares specifically designed manuals for implementing earth science field projects on school sites and models best teaching techniques for hands-on learning. Teachers prepare an "Earth Science Action Plan" to improve their school's earth science curriculum and to provide in-service to their colleagues.

Project Scientifica

Award number:	9155440
Funding:	$281,415
PI:	Georgiana Searles
Co-PIs:	Thomas H. Krakauer, Don F. Kirksey
Institution:	North Carolina Museum of Life and Science, Durham, NC
Dates:	April 15, 1992–September 30, 1995

This project in informal learning in the physical sciences is coordinated with the local middle school's 6th grade science program and held in the Discovery Room. The activities are (1) mentoring through pairing of the students with participating private sector scientists, (2) two 40-hour teacher in-service institutes on use of the resources in the Discovery Room, (3) replication of eight Discovery Room activities for classroom use throughout the museum's greater region, and (4) development and dissemination of materials that permit replication of *Project Scientifica* by other institutions. The partnership bears about 58 percent of the anticipated project costs.

Computational Training for Teacher Enhancement, Action, and Motivation

Award number:	9353416
Funding:	$383,823
PI:	Carole C. Smith
Co-PIs:	Johnny L. Houston, Helen M. Parke, Jeffrey C. Huskamp, Virginia Noblitt
Institution:	Camden County Schools, Camden, NC
Dates:	September 15, 1993–February 28, 1997

This project links a small rural North Carolina school district to community, university, and computational resources. It supports them in building curriculum unit ties to local issues and in training teachers to deal with the concomitant technologies. Teachers are central to school change and become local mentors and change agents, supporting their colleagues in adopting computational interdisciplinary approaches.

Initial plans focus on specific skills taught in the context of wetlands, which are vital to the local area. A multigrade sequence of activities is envisioned to tie together the work of students in the elementary, middle, and high schools. In the early grades, teachers and students focus on simple simulations and visual representations. In the middle grades, they deal with dynamic models and student representations. In the high school, they work with numerical methods and computational methodologies and have access to software on the Cray at the North Carolina Supercomputing Center. Forty-two K–12 teachers are trained throughout the life of the project.

The partners in the project include Elizabeth City State University providing access to the network, equipment, and technical expertise; East Carolina University helping with curriculum change; the North Carolina Supercomputing Center training the staff in computational science; and the North Carolina Science and Mathematics Alliance extending the goals of the NSF-supported *State Systemic Initiative* to the Camden school district. Cost-sharing is 45 percent of the NSF award.

OHIO

Engineering Awareness for High School Teachers

Award number:	9353395
Funding:	$260,161
PI:	Lawrence J. Badar
Co-PI:	W. Sanford Topham
Institution:	Case Western Reserve University, Cleveland, OH
Dates:	September 1, 1993–August 31, 1996

Participating high school teachers from northeast Ohio have access to a state-of-the-art materials and engineering laboratory. They work in seven different areas of engineering: computer engineering, materials engineering, electrical engineering, mechanical civil engineering, chemical engineering, biomedical engineering, and systems engineering. The major components of this project are two Saturday workshops and a 1-day program during each academic year for 120 accomplished teachers; 2-week, all-day summer institutes for 30 commuting teachers; sustained support and networking of teachers with Case Western Reserve University faculty; and a requirement that institute participants conduct engineering career programs for other teachers, students, parents, guidance counselors, and administrators. Workshop attendees experiment with project kits, relating real-world engineering problems to classroom activities. Teachers also engage in discussions and demonstrations of various engineering disciplines. It is intended that the hands-on experience with engineering projects and design provides content and new methods useful to them in teaching their courses and becomes a resource for career information.

Teacher Enhancement in Molecular Biology and Recombinant DNA Technology

Award number:	9155322
Funding:	$128,348
PI:	Jnanendra Bhattacharjee
Institution:	Miami University, Oxford, OH
Dates:	May 15, 1992–October 31, 1995

This project trains 60 high school biology teachers (3 groups of 20 each year) in molecular biology, gene cloning, and recombinant-DNA technology. This training is being done at 2-week summer institutes that include both content and pedagogy, with emphasis on a hands-on approach. A curriculum consultant and a previous pilot-program participant work with the participants to identify and use content and laboratory procedures appropriately in the participants' classrooms. Project staff also introduce experiments into the participants' classrooms through academic-year support services and by establishing contacts for participants with other nearby Ohio universities and biotechnology industries. Cost-sharing equals 79 percent of the NSF award.

Project Grow: The Development of Hands-On, Inquiry-Based Middle School Mathematics and Science Teachers

Award number:	9353407
Funding:	$2,291,596
PI:	Aaron R. Burke
Co-PI:	Bernard G. Thompson
Institution:	Dayton City School District, Oxford, OH
Dates:	February 15, 1994–June 30, 1996

This project is designed to build on and extend the reform of school science and mathematics begun with the NSF-supported Ohio's Statewide Systemic Initiative, *Project Discovery*. The project (1) increases the number of inquiry-based middle school science and mathematics teachers in the western region from 180 to 600, (2) provides institute training to 54 mathematics and science coordinators or administrators, (3) recruits and trains nine western region college and university faculty to be content experts in the summer institutes, and (4) recruits 18 additional middle school teachers to serve as institute faculty. Academic leadership teams to staff the summer institutes for teacher enhancement consist of one scientist, one mathematician, and two master teachers. Three teams are trained for each region—one in mathematics and one each in physical and life sciences. These teams then offer intensive summer institutes to groups of teachers and administrators from every school in the western region. Each teacher receives 144 contact hours in one content area in a summer institute with 48 contact hours in the academic-year follow-up.

In addition the training of a large group of regional science and mathematics coordinators and administrators in the same inquiry model provides a mechanism for horizontal and vertical translation of the model in every school district. The western region of Ohio serves a large, urban, racially and ethnically mixed population, as well as a more homogeneous group scattered over a large rural area. Cost-sharing is 120 percent of the NSF award.

Technology Reform and Network Specialist In-Service Training (TRANSIT) Project

Award number: 8955047
Funding: $553,192
PI: Franklin D. Demana
Co-PIs: Alan R. Osborne, Thomas G. Ralley, Bert K. Waits, Carolyn R. Mahoney
Institution: Ohio State University Research Foundation, Columbus, OH
Dates: March 1, 1990–June 30, 1995

TRANSIT belongs to the special teacher enhancement program, *Projects to Promote the Effective Use of Technology in the Teaching of Science and Mathematics*. The Ohio State University conducts a project to establish a network of 18 regional sites for implementing new and emerging technology-enhanced mathematics programs in middle and secondary schools. Each site is staffed by a team that trains middle and secondary mathematics teachers in the region as technology specialists. In turn, the technology specialists provide in-service and support for local mathematics teachers. The project produces 36 technology specialists and six modules to serve as a base of examples for the in-service work. The technology focus is on advanced graphing and symbol-manipulating calculators. This focus represents the technology area of highest priority within the mathematical community at this time. The Ohio State University and participating school districts are contributing an amount equal to 41 percent of the NSF award.

Grassroots Science Leadership Institute

Award number: 9353464
Funding: $737,120
PI: Claudia Khourey-Bowers
Co-PI: Norman A. Mankins
Institution: Canton City Schools, Canton, OH
Dates: February 1, 1994–July 31, 1998

This project trains all of the middle school science teachers and 80 elementary teachers from the Canton City School District of Ohio. The middle school teachers are trained in two 4-week workshops in content, pedagogy, and leadership. The training includes immersion in hands-on science. The elementary teachers have only one 4-week workshop, but they already have had considerable in-service work. On average, four elementary teachers for each of the 18 elementary schools are being trained. Fifty-eight people—principals and other personnel from each of the 32 elementary and middle schools—are also involved in the training to maximize the likelihood of systemic change. Cost-sharing is 12 percent of the NSF award.

Teacher-Student-Industry Model Math

Award number: 9053816
Funding: $161,960
PI: Barbara H. Patterson
Institution: Cleveland Education Fund, Cleveland, OH
Dates: September 15, 1990–August 31, 1995

This project aims to improve student performance by incorporated the NCTM standards for teaching high school mathematics into Cleveland schools. A representative racial and gender mix is being sought in enrollment in classes and in the contact the students have with the business partners. A new curriculum is being developed and implemented in Cleveland high schools. Problem-solving abilities are being enhanced. The effectiveness of the NCTM standards in an urban setting are being determined.

Project TEEM (Teacher Enhancement in Elementary Mathematics)

Award number: 9355547
Funding: $1,931,632
PI: Barbara H. Patterson
Co-PI: Martha E. Leen
Institution: Cleveland Education Fund, Cleveland, OH
Dates: August 15, 1994–July 31, 1998

This project is designed to provide mathematics content and leadership training for two teachers from each of the 87 elementary schools in the Cleveland Public Schools for a total of 82 days of enhancement per teacher leader. Principals from all buildings receive information on mathematics reform, staff preparation, and district requests for staff support at the building level. Each summer, the lead teachers receive additional preparation in mathematics content, teaching of mathematics, and leadership skills. During each school year, the lead teachers meet monthly with project trainers. The project provides annual seminars on awareness and training for principals and parent representatives. Cost-sharing is 9 percent of the NSF award.

Teaching Science with Terrific Opportunities for Youth in Science: Cultivating Advancements in Physical Science (TOYS: CAPS)

Award number: 9355523
Funding: $1,524,090
PI: Arlyne M. Sarquis
Co-PIs: Beverley A. Taylor, Jerry L. Sarquis, James E. Poth, Dwight J. Portman
Institution: Miami University, Middletown, OH
Dates: May 1, 1994–October 31, 1997

Through *Teaching Science with TOYS*, more than 475 K–12 teachers nationwide have brought *TOY*-based science into their classrooms using nearly 100 activities. *TOYS: CAPS* actively cultivates

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district-level systemic implementation of *TOY*-based physical science education. Teams of two and three teachers and one administrator participate in a 3-week summer workshop that includes working directly with students in a summer camp. Academic-year follow-up includes fall and spring sessions either at the Miami University host site or at a regional university affiliate site, at which participants report on activities, share sessions, and exchange ideas. In-service workshops are being held with the technical support from *TOYS* staff and/or university affiliates. Eighteen *TOYS* graduates per year undergo extensive training to enhance their pedagogical content knowledge and develop leadership skills to become district leaders.

This program overlaps with the *Teacher/Administrator Program* (*TAP*) in which teams of 36 underprepared teachers (grades K–9) and administrators attend programs run by the *TOYS* leaders and faculty. University affiliates (two college or university science or faculty members per summer) participate to replicate the program regionally, create *TOYS* centers throughout the United States, and implement hands-on *TOY*-based activities in local schools. University affiliates also include *TOY*-based activities in their pre-service science education courses. Through the *Teacher/Researcher Program*, 12 peer writers per year work with *TOYS* faculty to research, develop, and test activities and teacher resource modules. In *TOYS: CAPS*, 378 teachers, representing 66 district teams and six university affiliates, are directly enhanced. An estimated 3,000 additional teachers will be reached through in-service and other outreach activities. Academic-year programming focuses on regional teams within commuting distance, and summer programming are aimed at a national audience.

OKLAHOMA

EARTHSTORM (Earth-System Education for Science Teachers Using the Oklahoma Regional Mesonetwork)

Award number:	9155306
Funding:	$766,094
PI:	Ken C. Crawford
Co-PIs:	Beverley McMillan, Renee A. McPherson, Gary D. Sacket, Ann L. Cavallo
Institution:	University of Oklahoma, Norman, OK
Dates:	June 15, 1992–November 30, 1995

This project is aimed at middle and high school science and mathematics teachers who are interested in the incorporation of real-time environmental data in their classroom activities. This multidisciplinary project combines meteorology, climatology, computer graphics, telecommunications, geography, geology, and agriculture in a series of applied environmental activities. It uses the existing Oklahoma Mesonetwork, an array of 107 automated environmental monitoring stations. For each year of its duration, the project provides the tools for initiation, implementation, and evaluation of the use of Mesonet data in participant classrooms by offering (1) a 3-day computer course, (2) a 3-week teacher education institute and curriculum development session, (3) a 2-day science fair and conference during the following school year, (4) a computer newsletter, (5) a computer bulletin board and electronic mail system for teachers, and (6) a continuing mentorship program. This project is supported by the State of Oklahoma, Oklahoma University, local school districts, and Atmospheric Radiation Monitoring project (U.S. Department of Energy).

Program to Improve the Science Curriculum in Elementary School (PISCES): Workshops to Develop Oklahoma Teachers

Award number:	9155215
Funding:	$1,061,824
PI:	Robert E. Howard
Co-PIs:	James B. Tapp, Eileen W. Kelble
Institution:	University of Tulsa, Tulsa, OK
Dates:	June 15, 1992–November 30, 1995

A series of workshops for underprepared elementary teachers across the entire state of Oklahoma is being offered in a 5-week workshop experience, at which teachers are exposed to exemplary instructional materials and the most current approaches to inquiry-based teaching methods. The teachers develop their own lesson plans based on these proven instructional materials and conduct classes for children in a practicum setting. The following summer these same teachers receive a more advanced 5-week workshop that prepares them to act as lead teachers in their home school districts.

The workshops create a cadre of 150 trained leader teachers across Oklahoma. Each of these teachers is capable of catalyzing change in his or her own school and school district. The use of teachers as trainers and mentors of other teachers is a highly effective means of effecting broad-based improvements in science instruction. The cost-sharing amounts to 127 percent of the NSF award.

OREGON

Integrating Science Concepts

Award number: 9355532
Funding: $1,204,242
PI: Juliet Baxter
Co-PI: Norman G. Lederman
Institution: Eugene School District 4J, Eugene, OR
Dates: May 15, 1994–September 30, 1996

Integrating Science Concepts enhances the scientific literacy and teaching of K–8 teachers in Eugene School District 4J. Teachers develop skills in creating and presenting constructivist, activity-based instruction that integrates science with other disciplines. The first year, 16 master teachers participate in a 15-day summer workshop with project staff, Willamette Science and Technology Center and Oregon State University experts in pedagogy, and University of Oregon scientists. In the following years, these master teachers and project staff work with an additional 72 mentor teachers to develop the skills and knowledge to teach peers. Workshop activities include hands-on scientific investigations focusing on particular science concepts, critical analysis of exemplary concept-based science curricula, and participants' design of concept-based science units to use in classrooms. Regularly scheduled follow-up sessions support teachers in implementing these units.

The Role of the Laboratory in Learning Chemistry in the 1990s

Award number: 9253236
Funding: $541,988
PI: Christie Borgford
Co-PIs: Bruce W. Brown, David C. Cox
Institution: Portland State University, Portland, OR
Dates: December 15, 1992–May 31, 1996

This project enrolls 25 well-prepared high school chemistry teachers each year to acquaint them with the chemistry processes used in industry and connect those processes to the high school chemistry course. The teachers meet during the academic year and in the summer for 27 days. Teachers visit research and industrial laboratories, study laboratory management and instruction issues, and prepare laboratory experiences for application to the regular classroom. Each teacher works to disseminate the approach in his or her district. Cost-sharing is 7 percent of the NSF award.

National Dissemination of Calculus Reform in High Schools by the Oregon State University Calculus Curriculum Project

Award number: 9252469
Funding: $1,619,690
PI: Thomas Dick
Institution: Oregon State University, Corvallis, OR
Dates: March 1, 1993–August 31, 1996

This project aims to prepare high school mathematics teachers nationwide to integrate the use of graphing calculators and symbolic manipulation software into their teaching of calculus. At the same time, the project also serves to disseminate instructional materials that integrate the use of such technology into the teaching of calculus (Oregon State University Calculus Project).

Participating teachers attend intensive 2-week summer workshops offered at several sites around the country. During the following academic year, these teachers implement the new calculus program in their respective schools. In this endeavor, teachers are supported by a variety of communication networks (including electronic ones), as well as periodic 2-day regional follow-up meetings. The cognitive and affective factors involved in learning and teaching calculus with technology are being studied. The evaluation component focuses on student and teacher outcomes, with special emphasis on student participation and performance in subsequent college mathematics courses. A leadership component of the program provides special training to 25 teachers aimed at preparing them to initiate calculus and technology in-service efforts around the country. Cost-sharing is 67 percent of the NSF award.

Cross-Curricular Systems Thinking and Dynamic Using STELLA: Project CC-STADUS

Award number: 9254631
Funding: $764,971
PI: Diana Fisher
Co-PIs: Stephen M. Carlson, Ronald J. Zaraza, Jonca Katarzyuna
Institution: Multnomah County School District No. 1, Portland, OR
Dates: May 1, 1993–October 31, 1996

CC-STADUS is training a substantial number of teachers of science, mathematics, and social studies in systems thinking. One hundred teachers learn to use modeling systems, including *STELLA*, which is available for even low-end Macintosh computers, to represent and solve complex problems. Twenty-two teachers constitute the core team that accumulates, develops, and disseminates models related to mathematics, science, technology, and society. Partnerships with local industry and agencies help by providing the ongoing support teachers need to develop relevant models.

Even though the project directly serves only teachers in Oregon, it includes other supports for teachers, such as the information of a national user's group for educators, networking in a way that permits sharing models, and significant commercial involvement in providing useful real-world models. Through this project, teachers begin building interdisciplinary applications for their courses. These models help students to understand and represent complex processes. Cost-sharing is 22 percent of the NSF award.

National Science and Technology Week Teacher Training and Materials Dissemination Network

Award number:	9050203
Funding:	$175,244
PI:	David Heil
Institution:	Oregon Museum of Science and Industry, Portland, OR
Dates:	July 1, 1990–March 31, 1996

This project forms a network that uses a series of training and orientation workshops for K–12 teachers throughout the nation to disseminate information and materials on the NSF-sponsored *NSTW* program and to create a cadre of *NSTW* ambassadors. The workshops serve almost 5,000 teachers and in turn influence 530,000 students, including a significant number from underrepresented groups. Cost-sharing from the corporate sponsors of *NSTW* is 86 percent of the NSF award.

Project PHYSLab

Award number:	9254498
Funding:	$383,300
PI:	Lowell G. Herr
Co-PIs:	Peter Parlett, Kenneth Appel, R.S. Skinner, Lynda Jones
Institution:	Catlin Gabel School, Portland, OR
Dates:	June 1, 1993–May 31, 1997

Project PHYSLab serves 20 high school physics teachers each year, focusing on a 3-week workshop to learn and experiment with current technology designed to help students understand fundamental concepts in nature. Teachers work with microcomputer-based laboratory interfaces, spreadsheets, and a variety of physics-related courseware. Teachers experiment with motion, force, temperature, magnetic field, light, sound, and radioactivity probes. Computer interfacing experiments include the use of photo-gates and smart pulleys. In addition to the assortment of instructional hardware, a wide variety of physics-related software is used for data analysis. Graphical analysis, equation fitting programs, spreadsheets, simulation software, and mathematical programs are all available for data analysis, computational instruction, and independent study.

Not all *PHYSLab* experiments require the use of a computer. A low-cost digital timer yields excellent data in projectile motion, free-fall, sound, and simple harmonic motion experiments. Non-computer laboratory equipment provides graphical methods for analyzing two-dimensional collision problems. Innovative laboratory experiments focus on fundamental and subtle concepts that students frequently find difficult. Many of the experiments are designed to overcome misconceptions students bring to the physics classroom.

Project PHYSLab prepares teachers to help their students hypothesize, think, reason, understand, challenge, and analyze as they examine fundamental scientific ideas. It prepares physics teachers to lead workshops for their peers. Each participating teacher gives at least two such workshops during the academic year following the summer workshop. Workshops are held at Catlin Gabel School and at national meetings of the American Association of Physics Teachers. The workshop continues using the worldwide Internet for an extensive system of follow-up support and interactive experiences. A network of follow-up activities and services is in place so that support for teachers continues well after the formal workshop ends. Cost-sharing equals 60 percent of the NSF award.

Translating Current Global Environmental Change Research for Middle School Teachers

Award number:	9254447
Funding:	$587,791
PI:	Vicki Osis
Institution:	Oregon State University, Newport, OR
Dates:	April 1, 1993–September 30, 1996

This project provides leadership institutes for 148 middle school teachers on global environmental change issues through a network of sea-grant institutions in Oregon, Washington, Alaska, and Hawaii. The institutes are introducing research to middle school teachers concerning global issues, such as global climatic change, ozone depletion, marine and estuarine pollution, decline in biodiversity, and overpopulation. The project is strongly supported by each of the four states' Departments of Education.

Apprenticeships in Science and Engineering for Rural and Remote Areas

Award number:	9155444
Funding:	$367,639
PI:	Gail N. Whitney
Co-PI:	William G. Lamb
Institution:	Oregon Graduate Institute of Science and Technology, Beaverton, OR
Dates:	March 15, 1992–August 31, 1996

This project expands the *Apprenticeships in Science and Engineering (ASE)* launched in 1991 by its Saturday Academy with the placement of 80 students. Among the project's goals are increasing the opportunities for Hispanic and Native American students and integrating applied experiences from the field into the curriculum. An additional 75 students and five teacher monitors participate in the project each year, for a total of 300 additional students and 20 additional teachers. The partnership cost-sharing is 67 percent of the NSF award.

PENNSYLVANIA

Assessment Communities of Teachers (ACT)

Award number: 9353622
Funding: $2,743,290
PI: Diane Briars
Institution: Pittsburgh Board of Public Education, Pittsburgh, PA
Dates: August 15, 1994–July 31, 1997

ACT uses classroom assessment of students as a vehicle for professional development. The project supports the enhancement of classroom teachers in six urban districts—Dayton, Memphis, Milwaukee, Pittsburgh, San Diego, and San Francisco. The project plans to increase their knowledge of school mathematics and student learning through involvement in classroom assessment techniques. These cadres in each city then share experiences across the communities and implement teacher enhancement programs for their colleagues at the local level.

Project in Natural Science Psychology for High School Psychology Teachers

Award number: 9155209
Funding: $413,643
PI: Samuel Cameron
Institution: Beaver College, Glenside, PA
Dates: March 1, 1992–August 31, 1995

This project provides a 4-week summer program for 30 teachers each year to learn the basic science concepts of modern psychology. Topics include psychology, sensation, perception, learning, memory, and cognition. Teachers learn how to set up laboratory experiments and carry out classroom demonstrations, and they learn statistical principles to illustrate psychology concepts to their students. At the end of the workshop, the teachers have developed lesson plans in each topic area and are given curriculum materials that can be used in the classrooms. The follow-up portion of the project includes presentation of teaching modules at regional workshops and classroom visits by project staff to aid in the implementation of the new materials into the classroom. The college and schools' cost-sharing is 13 percent of the NSF award.

Chemistry for Children: A Program for Elementary and Middle School Teachers in Precollege Chemistry

Award number: 9154801
Funding: $276,044
PI: Arnold George
Co-PI: Scott A. Davis
Institution: Mansfield University of Pennsylvania, Mansfield, PA
Dates: June 1, 1992–November 30, 1995

This project provides 30 elementary and middle school teachers who have had little or no background in chemistry with experiences with chemistry. Teachers participate in two intensive 3-week summer workshops focusing on chemistry and science methods and receive on-site support from project personnel. Teachers also participate in a 3-day session on leadership and the presentation of in-services. Project staff continue their on-site support as participants incorporate what they have learned into their science classes and present their experiences to their colleagues. During the course of the project, staff and participants collaborate on the revision and enhancement of *Chemistry for Children*, an activity book of chemistry activities designed for elementary and middle school children. Cost-sharing is 15 percent of the NSF award.

Empowering Mathematics Teachers in Computer-Intensive Environments

Award number: 9155313
Funding: $999,317
PI: M. Kathleen Heid
Co-PI: Glendon W. Blume
Institution: Pennsylvania State University–University Park, University Park, PA
Dates: February 15, 1992–January 31, 1997

Pennsylvania State University is conducting a project to empower 300 middle and high school mathematics teachers in computer-intensive environments. In particular, teachers are prepared to implement computer-intensive curricula and teach computer-intensive algebra. The project engages participants in a computer-intensive mathematics course, a mathematics education course centered on student understanding, and research. Teachers complete these courses as they participate in the 4-week intensive summer courses and the follow-up activities during the school year. In addition, this project is assessing the effects of the courses on the teachers. Participants are recruited nationwide, with targeted areas of Washington, DC; Chicago; and San Francisco. The courses may apply toward eight graduate credits. The total number of teachers enhanced is 1,200. In addition, teachers learn new teaching roles that emphasize computer-based exploration of mathematical concepts. They are also developing new strategies for student assessment and evaluation. Pennsylvania State University and participating schools' cost-sharing accounts for 8 percent of the NSF award.

Graphics Calculators and Internet Coalition Conference

Award number:	9355468
Funding:	$75,174
PI:	Roseanne Hofmann
Institution:	Montgomery County Community College, Blue Bell, PA
Dates:	January 15, 1994–December 31, 1995

This project is a 2-day conference, January 28–29, 1994, on the use of graphing calculators for 200 middle and high school mathematics and science teachers with additional postsecondary participation. The conference was held at Montgomery Community College in Blue Bell, Pennsylvania. Participants received conference proceedings and committed to be part of an electronic mail network with regular contributions coming from conference leaders, participants, and technical support staff. The conference provided a graphing calculator to each of the 200 participants, and a project kit for each school from which teachers attend. Texas Instruments, Inc., has made the calculators and projector kits available to the conference project at discount prices. Participation in the conference requires a signed agreement of understanding from the teacher and the building principal to provide local access to the network and regular contributions by the teacher. The project evaluation is being carried out through two sets of participant questionnaires, distributed after 6 months and 1 year. A log of electronic mail use will be studied to get teachers into electronic dialog.

Mathematics: Opportunities in Engineering, Science, and Technology (MOEST)

Award number:	9153903
Funding:	$271,933
PI:	John R. Madden
Co-PIs:	Rita Smith-Wade-El, David Anderson
Institution:	Pennsylvania State University–University Park, University Park, PA
Dates:	September 1, 1991–February 29, 1996

This project intends to increase the number of African-Americans and Latinos entering careers in mathematics, science, engineering, and technology. Students, who are recruited in the 6th grade, participate in the project in grades 7 through 12. Based on a previous project, *MOEST* provides weekly 1-hour classes, mentors, well-designed excursions and follow-up discussions, motivational and vocational counseling sessions, and parent involvement. All the activities are run by a broadly representative advisory board. This project recruits 48 to 50 students each year into the program. In addition, a 5-week summer commuter project is underway, which immerses students in hands-on experiences, research projects, and excursions.

Environmental Focus

Award number:	9355655
Funding:	$239,383
PI:	James McGonigle
Institution:	Academy of National Science of Philadelphia, Philadelphia, PA
Dates:	September 15, 1994–August 31, 1996

This project, which provides 48 middle school teachers training in biological and environment sciences, has two parts: (1) it enriches the biological and environmental science background of teachers through summer institutes presented by academy research scientists and museum educators; and (2) it produces written curriculum materials and classroom/field kits. Cost-sharing for the institutions/agencies and school districts is 33 percent of the NSF award.

Juniata College Science Outreach Program

Award number:	9253293
Funding:	$1,784,335
PI:	Donald J. Mitchell
Co-PIs:	Kenneth Rockwell, James L. Gooch, Thomas W. Woodrow
Institution:	Juniata College, Huntingdon, PA
Dates:	September 1, 1992–February 29, 1996

This project expands upon the *Chemistry in Motion* project to include biology and the life sciences and offers training and support to 120 chemistry teachers, 80 biology teachers, and 40 middle and junior high school teachers. These teachers are recruited from a network of 45 to 50 school districts in two multicounty regions of Pennsylvania. The teachers participate in a series of 2-week summer workshops to update their knowledge of biological and chemistry concepts and to be trained to understand the practical uses of modern science instrumentation. Additional training teaches teachers how to develop laboratory materials and exercises appropriate for use in school classrooms and laboratories. The science van visits participating schools to refurbish their supplies of curriculum materials. A certified biology/chemistry teacher drives the van and acts as a resource for teachers. Additional follow-up includes special day-long seminars, an annual science fair, and the development of an active network of science teachers. Cost-sharing amounts to 81 percent of the NSF award.

Penn-Merck Collaborative for the Enhancement of Science Education

Award number:	9353405
Funding:	$1,786,651
PI:	Teresa Pica
Co-PIs:	Carlo Parravano, Nancy Streim
Institution:	University of Pennsylvania, Philadelphia, PA
Dates:	July 1, 1994–December 31, 1998

This project is promoting effective inquiry-based science teaching and learning in the elementary grades of the school district of

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Philadelphia. It has three principal objectives: (1) to improve the teaching of science through the establishment of a cadre of leader teachers to serve as mentors and change agents, (2) to deepen and extend students' knowledge and understanding of science by integrating science learning with instruction in the language arts, and (3) to motivate students from historically underrepresented groups to pursue further study and career selection in science and technology. The collaborative brings together teachers, university faculty, and professional scientists who share a commitment to the enhancement of science teaching and learning. The collaborative focuses its efforts in the district's southwest region, whose 25 schools have a predominantly minority population. Teams of four elementary teachers (grades 1–3) from these schools participate to build up a cadre of leader teachers. They attend an intensive 3-week summer institute, a graduate-level continuing education seminar during the academic year, and a 3-week institute during the following summer. In their classrooms, teachers use the Franklin Institute hands-on science kits as the springboard to exploring basic science concepts and discovering strategies for engaging students in their own explorations. Pre-service teachers are invited to attend the summer institutes. An annual spring conference brings together current and former participants to share information and experiences. By the end of the project, the school district will have in place 250 leader teachers. Cost-sharing is estimated at 44 percent of the NSF award.

Teacher Development and Research in STS Education for Rural Middle/Junior High School Science Teachers from Central Pennsylvania and Northern West Virginia

Award number: 9150232
Funding: $899,188
PI: Peter Rubba
Institution: Pennsylvania State University–University Park, University Park, PA
Dates: August 15, 1991–July 31, 1995

This project develops a cadre of *Science, Technology, and Society* (*STS*) teachers at the middle/junior high school level in rural areas of central Pennsylvania and northern West Virginia. This cadre of *STS* teacher leaders has the ability to develop and implement *STS* units. The project also investigates the effectiveness of the teachers in disseminating *STS* materials in their own schools as well as to the larger community of science educators. Cost-sharing is equivalent to 8 percent of the NSF award.

Commonwealth Excellence in Science Teaching Alliance (CESTA)

Award number: 9355732
Funding: $931,315
PI: Kenneth Schroder
Institution: Franklin Institute Science Museum, Philadelphia, PA
Dates: May 1, 1994–October 31, 1997

The *CESTA* project is an effort to improve inquiry-based science teaching throughout Pennsylvania by establishing a statewide cadre of middle school teacher leaders. *CESTA* provides 120 teachers with a series of intensive, professional development opportunities and technical support that enables them to (1) improve their knowledge of science content areas, (2) apply science to real-world situations, (3) strengthen their ability to facilitate inquiry-based science learning, and (4) develop leadership skills for the improvement of middle school science education. Teams of two to three teachers from each school are brought together to reform science education in their schools. Ultimately, their training will make these teachers leaders of science reform in their entire school district.

Philadelphia Science Resource Leaders for the Middle Grades

Award number: 9155402
Funding: $1,957,780
PI: Lynnette Smith
Co-PI: Anthony L. Dent
Institution: PATHS/PRISM, Philadelphia, PA
Dates: March 15, 1992–August 31, 1995

This project enhances the scientific skills of outstanding middle school physical science teachers of grades 7 and 8. These teachers later assist in improving the teaching practices of their less experienced colleagues through the development of science teacher leaders resource teams. Direct participation involves 182 middle school teachers. The project provides staff development that includes sequenced courses on important scientific concepts, principles, and ways of thinking; directed research in scientific problem-solving; and inquiry-based teaching in science. Cost-sharing is 22 percent of the NSF award.

Building Relationships with Industry for Delivering and Generating Educational Support (BRIDGES)

Award number:	9253287
Funding:	$330,993
PI:	James H. Taubler
Co-PI:	A.D. Landsperger
Institution:	Saint Vincent College, Latrobe, PA
Dates:	January 1, 1993–June 30, 1997

This project has collaborated the efforts of four school districts, local industry, and Saint Vincent College in support of mathematics and science education reform. The project consists of three components. First, ninety elementary teachers from the LaTrobe School District participate in a 10-day summer workshop. Their training is followed by continued support during the school year for implementation and evaluation of new mathematics and science activities. Second, 24 teams (six per participating school district) consisting of a junior or senior high school lead or mentor teacher, an industrial scientist, and a college scientist support the teachers. The scientists introduce the teachers to their work environments and assist them in the development of appropriate hands-on classroom activities to improve their mathematics and science courses. Finally, three 5-day seminars for 18 selected teachers to develop and implement an integrated mathematics-science capstone course for high school seniors in the four school districts are offered. Cost-sharing equals 120 percent of the NSF award.

Science Education Partnership for South Central Pennsylvania

Award number:	9355656
Funding:	$560,498
PI:	Allan F. Wolfe
Co-PI:	Dale Summers
Institution:	Lebanon Valley College, Annville, PA
Dates:	April 1, 1994–June 30, 1998

Lebanon Valley College and 12 school districts in south-central Pennsylvania have initiated a science education partnership affecting nearly 600 teachers and 20,000 students in grades 4–8. The goal is to strengthen science teaching by increasing teachers' knowledge of science, developing their understanding of hands-on and inquiry-learning pedagogies, and improving their skills to use hands-on classroom materials. Training is provided through summer institutes at which teachers, science faculty, and students work together on teams. In-service workshops that integrate approaches to science content, pedagogy, and development of practical and useful classroom science materials are also available to the teachers. A cadre of teachers serve as peer leaders in their districts, conducting workshops and institutes and nurturing their colleagues' long-term interest and confidence in learning new science content and instructional strategies. A resource center is housed at the college.

RHODE ISLAND

Zooscope: Focus on Middle School Teaching

Award number:	9353399
Funding:	$692,411
PI:	Sharon Lloyd Clark
Co-PI:	Peter Heywood
Institution:	Brown University, Providence, RI
Dates:	January 1, 1994–December 31, 1997

This is a collaboration among Brown University's Institute for Secondary Education, the Roger Williams Park Zoo, and the middle schools in Rhode Island and southeastern Massachusetts. The emphasis of the project is to have science teachers doing hands-on investigative laboratory work with university scientists at the zoo. Thirty teachers each year learn research techniques as they work at the zoo, exploring themes such as diversity and anthropology, reproduction and conservation, behavior-morphology, and environmental conditions. Workshops address teaching for collaborative learning, curriculum development, inquiry-based learning, and the use of technology. The project staff observe and provide support during the academic year. The project is designed to provide an opportunity for science middle school teachers to experience the zoo as a living laboratory and to encourage teachers to use innovative methods to enhance science education in the classroom. It also furthers the goals of the NSF-supported Rhode Island *State Systemic Initiative* project. The cost-sharing amount is 41 percent of the NSF award.

Math/Science Fellows: Restructuring Mathematics and Science in Essential Schools

Award number:	9254573
Funding:	$3,884,766
PI:	Mary Hibert Neuman
Co-PI:	Merle S. Bruno
Institution:	Brown University, Providence, RI
Dates:	March 15, 1993–August 31, 1997

The Coalition of Essential Schools (CES), in cooperation with Brown University, is sponsoring an interdisciplinary training project for 96 secondary mathematics and science fellows. The project is divided into three cycles with 32 teachers in each cycle. Teachers are provided with training in content knowledge and pedagogical techniques. The teachers also attend a 1-week orientation meeting to create working teams, each to consist of eight science teachers and eight mathematics teachers (designated as Fellows), one National Learning Faculty member, and two college faculty members (one science, one mathematics). These teams work together throughout the orientation and the summer institute. The use of electronic mail networks is incorporated into this project to maintain communication among the working teams. During the 4-week summer institute, the Fellows formulate essential questions, participate in experiments, design hands-on laboratory/fieldwork, do data collection and analysis, participate in problem-solving, and develop pedagogical skills in investigative style classes. In the second year, the Fellows attend an orientation to assess the progress of implementation of mathematics/science investigations in each school. They also develop additional essential questions and investigations, identify pedagogical issues for examination during the summer, receive extensive training in classroom observation and debriefing techniques, and learn skills of consultation and conflict resolution. The Fellows also work as consultants in 200 other essential schools located in states across the nation. Cost-sharing is 13 percent of the NSF award.

SOUTH CAROLINA

Partnership for Excellence: A Model Program for Professional Development of Middle and Secondary School Mathematics Teachers

Award number:	9155304
Funding:	$662,221
PI:	Celia L. Adair
Co-PIs:	Cynthia S. Kay, Judith S. Prince
Institution:	University of South Carolina–Spartanburg, Spartanburg, SC
Dates:	June 1, 1992–November 30, 1996

This project provides 685 middle school and high school mathematics teachers in four counties in South Carolina with seminars by nationally known speakers, in-service workshops, and academic-year short courses. In addition, a series of intensive 5-week summer institutes are offered for 48 leader teachers. The seminar series and workshops are designed to build support among the teachers and in the community for excellence in mathematics as well as enhancing administrative awareness and support for the efforts. The project is designed to determine effective strategies for enriching the teachers' understanding of mathematics and students' ability to communicate mathematics and for implementing inquiry-based science teaching. Course materials are developed to aid in the implementation of exemplary classroom teaching practices.

SALT: Specialists and Lead Teachers in Elementary Mathematics

Award number:	9253179
Funding:	$697,461
PI:	Patty Smith
Co-PI:	Elizabeth L. Lashley
Institution:	School District of Pickens County, South Carolina, Clemson, SC
Dates:	February 15, 1993–July 31, 1997

SALT offers courses and workshops for participating teachers from each public elementary school in Pickens County. These teachers are becoming the core of lead teachers and mathematics specialists so that every elementary school has one or two lead teachers or a mathematics specialist. These teachers are trained in a hands-on, problem-solving approach to learning mathematics, and they become resources for other teachers in their schools. This project is an extension of a pilot program that put a mathematics specialist in the Forest Acres Elementary School.

SOUTH DAKOTA

Native American Mathematics and Science Education Leadership

Award number:	9353470
Funding:	$1,637,101
PI:	Leland M. Bordeaux
Co-PIs:	David L. Weisser, Mark Ward
Institution:	Sinte Gleska College Center, Mission, SD
Dates:	February 1, 1994–May 31, 1996

This project is developing leadership teams of teachers to improve mathematics and science education for more than 1,000 Native American elementary students. The project coordinates with the NSF-supported South Dakota *Statewide Systemic Initiative*; the *SKILL (Scientific Knowledge for Indian Learning and Leadership)* program; Dakota BBS, a small Native American-owned business; and several local school districts. Ninety-four teachers and 21–24 administrators from at least eight target schools participate in the project. Thirty-two teachers (16 from grades K–4, 16 from grades 4–8) enter the project at the beginning of the first summer institute. This group participates fully in the project at least until the end of the second summer institute. After their training, teachers are expected to act as mentors and facilitators. Mathematics and science education courses are offered for 6 hours of graduate credit. An additional two graduate credits can be earned each summer. Class members develop integrated, culturally relevant learning units, learn and practice leadership skills, interact in small learning groups with administrators, and conduct individual or group learning projects. At least two administrators from each target school attend at least one summer institute for 1 week and participate in mathematics and science education improvement in their school. The project targets Native American families, who are asked to participate in family mathematics in-service programs. Follow-up activities include the following: (1) monthly Saturday seminars; (2) a bulletin board system, which provides peer support for teachers, opportunities for collaborative teacher/student project undertakings both among program schools and nationally, and worldwide access to information; and (3) the Rural Development Telecommunications Network, a two-way interactive TV network that links 13 strategic locations in the state by fiber-optic cable. Four 2-hour teleconferences are held each year. Cost-sharing on the project is 13 percent of the NSF award.

TENNESSEE

West Tennessee Geography Project

Award number: 9353339
Funding: $741,481
PI: Duane Giannangelo
Institution: Memphis State University, Memphis, TN
Dates: January 1, 1994–June 30, 1998

This project is improving the geography knowledge of 90 teachers: 30 elementary teachers the first year, 30 middle school teachers the second year, and 30 secondary school teachers the third year. Each of the three workshops provides intensive (7 hours/day), 6-week content enrichment in geography. These same teachers also develop leadership skills and contribute to the development of an in-service training manual to be used with teachers during the academic year. These seminars are conducted by university personnel and summer teacher participants. The cost-share of this project is 36 percent of the NSF award.

Reaching for Excellence in Secondary School Science

Award number: 9150188
Funding: $650,000
PI: Jack Rhoton
Institution: East Tennessee State University, Johnson City, TN
Dates: February 1, 1992–January 31, 1997

This project provides a 6-week summer program for 28 teachers and 7 principals. The participants selected form teams of two middle school science teachers, two high school science teachers, and one principal, all from the same school district. The summer program teaches an integrated science curriculum that emphasizes hands-on science and problem-solving, as required by the new Tennessee State curriculum guidelines. The participants return to their schools to carry out leadership activities. It is expected that altogether 100 teachers will be served by the project each year. The project is coordinated with a previous K–6 project, and thus a coordinated K–12 science curriculum is being developed in the target schools. Cost-sharing is 30 percent of the NSF award.

TEXAS

Texas Regional Enhancement Program for Underprepared Physics Teachers

Award number: 9154812
Funding: $398,622
PI: Robert B. Clark
Institution: Texas Engineering Experiment Station, College Station, TX
Dates: June 1, 1992–November 30, 1995

The purpose of this project is to conduct a regional cooperative program for the content and pedagogical training of 24 underprepared high school physics teachers. The project uses an instruction team consisting of experienced, highly successful high school physics teachers who have been trained as Physics Teaching Resource Agents (PTRA's) and physics professors from a community college and a university. The project has three components: (1) a 2-week series of summer workshops that focus on the most challenging aspects of the first-year high school basic physics course, (2) a series of follow-up workshops on supplementary topics, and (3) classroom and school visits by experienced teachers to provide participants with mentoring and assistance in the implementation and evaluation of the program.

Texas Regional Enhancement Program for Underprepared Physical Science Teachers

Award number: 9253357
Funding: $383,158
PI: Robert B. Clark
Co-PI: Merlin L. Peck
Institution: Texas Engineering Experiment Station, College Station, TX
Dates: April 1, 1993–July 31, 1996

This project provides for the enhancement of content knowledge and pedagogical skills of 24 underprepared teachers of physical science in Texas. The program uses the instruction of a team of highly experienced and successful high school physical science teachers who are officers of TTOPS (Texas Teachers Organization for Physical Science) in conjunction with a pair of university professors in physics and chemistry. The project includes three components: (1) a 2-week series of summer institute workshops on basic high school physical science concepts, (2) a series of follow-up workshops during the academic year on supplementary topics, and (3) visits to the school and classroom of the participants to provide assistance with the implementation, evaluation, and reinforcement of the program. Cost-sharing is 25 percent of the NSF award.

Science Classroom Assessment and Teaching Strategies

Award number: 9355569
Funding: $682,501
PI: Linda Crow
Institution: Baylor University College of Medicine, Houston, TX
Dates: May 1, 1994–April 30, 1997

Participating in a series of 3-week institutes and eight academic-year follow-up meetings, a core of 45 leader science teachers from middle schools in the Houston Independent School District gain new skills in instructional practices, student assessment, test and measurement statistics, and important related science content. This core group then serves as workshop leaders and as human resources for their peers in their schools and district. The goal of this project is to produce teachers who can implement authentic assessment of science, use the best science teaching practices, and provide the classroom environment needed to achieve the goals specified by current science reforms such as *Project 2061*; *Scope, Sequence, and Coordination*; and the emerging national standards. The project uses a three-part model that directly links the desired goals for students, the behavior of the teacher (including assessment), and the role of the student necessary to achieve these goals. Intertwined with this model is the need for teachers to understand the targeted science concepts and relevant statistical test measurements. The project includes research to assess its effectiveness and its impact on student learning.

Rice University/HISD Science Partners for Houston Project

Award number: 9155389
Funding: $1,649,143
PI: Elnora S. Harcombe
Co-PIs: Ronald L. Sass, Linda M. McNeil
Institution: William Marsh Rice University, Houston, TX
Dates: July 1, 1992–June 30, 1996

A science collaboration project between Rice University, the Houston Independent School District (HISD), businesses, and industry plans to enhance the scientific skills of teachers at the middle school level. The program calls for the establishment of resident teacher positions to be filled by qualified HISD candidates. These teachers participate in enrichment programs that provide exposure to modern scientific and technical materials and knowledge, businesses and industry applications, and up-to-date educational theory. Three hundred middle school teachers are participating in this teacher enhancement project. Cost-sharing is equivalent to 120 percent of the NSF award.

Enhancement Program for Physical Science Teachers

Award number: 9254428
Funding: $490,145
PI: Hugh T. Hudson
Co-PI: Mamie W. Moy
Institution: University of Houston, Houston, TX
Dates: April 1, 1993–March 31, 1996

This leadership project enables two cohorts (24 each) of Houston-area 8th and 9th grade physical science teachers to attend a leadership institute at the University of Houston–University Park. The leadership program involves a 2-week summer institute and six Saturday workshops during the academic year. Each cohort receives enhancement in physics and chemistry content and appropriate pedagogy for 2 years. To broaden a teachers' network, teachers are attending a professional meeting of the Texas Science Teachers' Association. Leader teachers are in charge of peer-led workshops in their local and neighboring districts. Cost-sharing equals 10 percent of the NSF award.

Texas Biotechnology Teacher Enhancement Project (BTEP)

Award number: 9155343
Funding: $1,604,319
PI: Robert K. James
Co-PIs: Edward A. Funkhouser, Donald W. Pettigrew, Comer O. Patterson
Institution: Texas A&M University Research Foundation, College Station, TX
Dates: December 15, 1992–November 30, 1995

The BTEP helps a significant portion of the estimated 2,000 high school biology teachers in the Texas Gulf Coast Region implement biotechnology concepts in their introductory biology classrooms. The project consists of extensive training of previous 4-day workshop participants in 3-week summer institutes; a collaborative network of scientists from the private sector, Texas A&M Research and Extension Centers, and cooperating institutions; a broad-based advisory board; and a highly skilled staff who carry out a carefully designed implementation support process and project data collection. Upon successful implementation of biotechnology concepts in their classrooms, selected institute participants lead awareness and 4-day workshop activities in their local areas, with support from local research and extension centers and cooperating institutions. Specifically, 1,200 Biology I teachers attend awareness sessions (1–2 hours); 440 Biology I teachers participate in 4-day workshops; and 90 Biology I teachers participate in three 3-week summer institutes to be held at Texas A&M and other regional sites. Cost-sharing equals 14 percent of the NSF award.

High School Psychology Teacher Workshop—A Network Approach

Award number: 9254584
Funding: $613,505
PI: Richard Kasschau
Institution: University of Houston, Houston, TX
Dates: May 1, 1993–July 31, 1996

Forty high school psychology teachers have been chosen to attend a 4-week workshop at the University of Houston. The workshop has a multiplicity of components in which each of the teachers learn about psychology, educational theory and research, the development of effective demonstrations and teaching techniques, and the fostering of communication between high school and college teachers. Over the course of the following 2 years, each teacher agrees to complete a research project in some particular area of psychology. Each teacher is expected to access an electronic network where a 5- to 10-page update is being posted at least once each month. These updates are being prepared initially by the faculty of the University of Houston and Western Carolina University but will be broadened in succeeding years to include faculty from other universities. The cost-share of this project represents 21 percent of the NSF award.

Austin Science and Math Consortium: A Private Sector School Partnership for Tomorrow's World

Award number: 9053838
Funding: $399,404
PI: Mary N. Long
Co-PIs: Wesley Halverson, Leslie Cohen, Kenneth Heydrick
Institution: Austin Independent School District, Austin, TX
Dates: January 1, 1991–June 30, 1995

The Science Academy of Austin is conducting a project to restructure the mathematics and science curricula in grades K–12 and implement a districtwide integrated thinking curriculum. The project addresses the uses of technology in education, environmental issues, and scientific and mathematical literacy. Sixty teachers are training each summer in the use of technology. Two summer institutes are conducted in the *Biological Science Curriculum Study* elementary school curriculum, and teachers participate in environmental summer programs. Linkages are being developed among teachers, students, university faculty, and public- and private-sector leaders. Each year, an additional 10 to 15 Science Academy students conduct classes in elementary schools. Interdisciplinary Science Academy courses are being developed on planet earth, physics, and technology.

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A Professional Development School Model of Teacher Enhancement in Elementary School Mathematics and Science

Award number: 9253276
Funding: $1,773,405
PI: Kathleen Martin
Co-PI: Sharon Reynolds
Institution: Texas Christian University, Irving, TX
Dates: November 15, 1992–April 30, 1997

The goal of the project is to improve the mathematical and scientific content of elementary school students by developing teacher enhancement models. The four school districts send six teachers to participate in the project, and each year, additional school districts participate in the project. Two teachers coordinate the activities between districts. Twenty-six leadership teachers participate in weekly 2-hour seminars during 30 weeks of the academic year to enhance their subject field and pedagogical knowledge and learn appropriate modes of working with adult learners. During the summers, the leadership teachers conduct workshops with teachers within their schools. The bridge teachers are responsible for creating a network between the school districts, the university, and eventually other schools in the district. Administrators and parents also participate in the activities to help accomplish change. Cost-sharing is 18 percent of the NSF award.

C^{3}P Comprehensive Conceptual Curriculum for Physics

Award number: 9254590
Funding: $2,013,559
PI: Richard Olenick
Institution: University of Dallas, Irving, TX
Dates: June 15, 1993–November 30, 1997

This project is a research and development effort to produce a comprehensive, conceptual physics program that integrates video-based, inquiry-based, and laboratory-oriented materials. In the initial stage, an oversight committee composed of physicists, researchers, and other experts examine existing materials—*PRISMS*, *CASTLE*, *InfoMall*, *Physics Teach to Learn*, and *Mechanical Universe*—to assemble coherent, multifaceted core curriculum materials for teachers of physics and to produce a workbook for students. All the materials chosen are selected according to students' preconceptions and misconceptions. An academic council of high school teachers develops a draft of the comprehensive program for review by the oversight committee. The project staff then refine the materials. Next, the core curriculum is introduced to 75 Leaders of Physics Instruction (LPI's) at a 4-week-long summer leadership institute at the University of Dallas. During this institute, the LPI's explore the materials and their effective use, gain insights into teaching through a conceptual approach, and have the opportunity to teach certain concepts to their peers. During the following academic year, these teachers use the materials in their classrooms and evaluate their effectiveness for improving students' understanding of physical concepts. Next, the LPI's offer workshops for less-prepared physics teachers in their regions. Local educational agencies purchase the materials for the teachers. Finally, the LPI's have a follow-up session to assess the workshops and make plans for continuation of the program beyond the period of NSF support. Through the continued offering of workshops by LPI's, it is estimated that each year 750 teachers and 30,000 students will be affected by the project. Cost-sharing equals 100 percent of the NSF award.

Teachers as Research Partners: Testing a Problem-Solving Curriculum Model That Integrates Mathematics and Science

Award number: 9253281
Funding: $1,129,271
PI: Carol L. Stuessy
Co-PIs: Gerald Kulm, Patricia A. Alexander
Institution: Texas A&M University–Main Campus, College Station, TX
Dates: January 1, 1993–December 31, 1996

This project has established collaborative partnerships among university educational researchers and practicing middle school classroom science teachers to enhance the expertise and professionalism of middle school science teachers in the State of Texas and to produce a field-tested model for the development and integrated mathematics and science problem-solving curricula. Texas teachers are involved at two levels. Three teachers in the areas of mathematics, science, and computers are chosen to lead the project. Their responsibilities include teacher training, and 30 teachers, chosen from throughout the State of Texas, receive instruction, write and field-test the prototype, and assist in the research activities of the project. Cost-sharing is equivalent to 2 percent of the NSF award.

UTAH

Elementary Mathematics Through Teacher Partnership

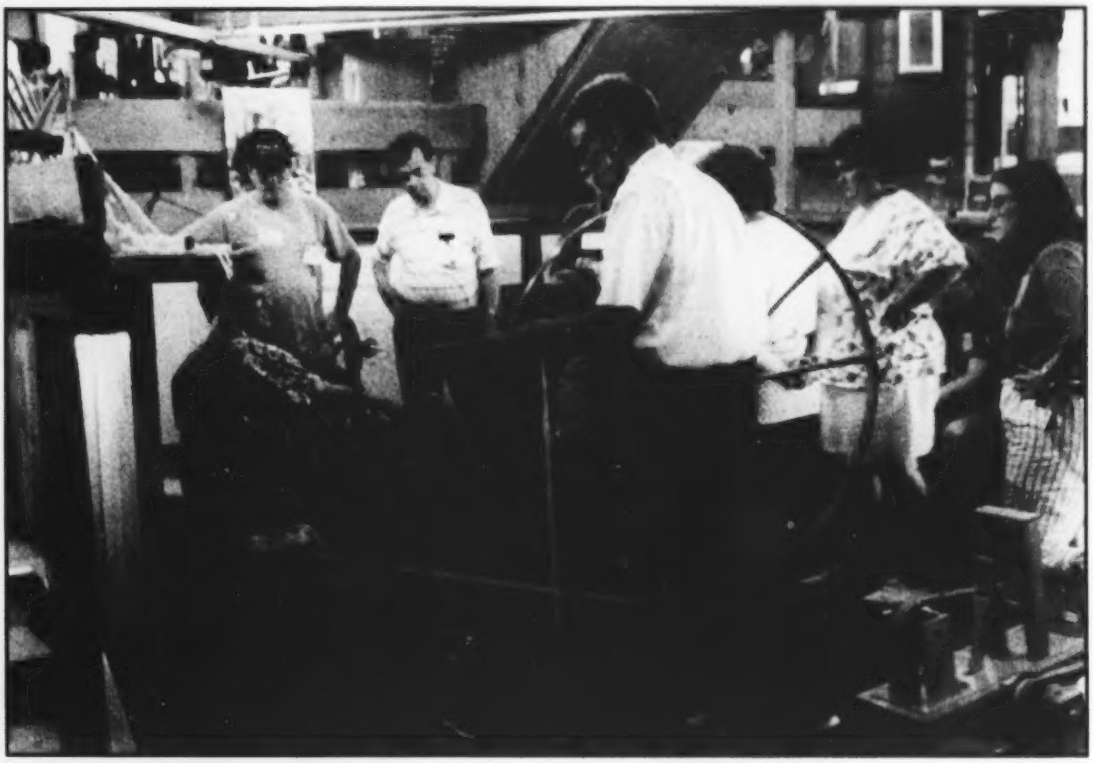
Award number: 9253227
Funding: $372,845
PI: C. Clemens
Institution: University of Utah, Salt Lake City, UT
Dates: August 1, 1992–July 31, 1996

This project creates a partnership between Washington Elementary School and the Institute for the Theory and Application of Geometry of the University of Utah. The project establishes Washington Elementary as a model for teacher-driven reform in elementary mathematics education. The program includes two 4-week summer workshops on mathematics content, exemplary materials, and teaching methodologies, followed by implementation programs during the school year. The project includes an outreach component to satellite schools. The university and the school district provide a cost-share of 22 percent of the NSF award.

Davis County Private Sector Partnerships for Math and Science Improvement (Davis County PSP)

Award number: 9153937
Funding: $308,366
PI: LaMont Jensen
Co-PIs: Richard Nelson, Hugh Dickey
Institution: Davis County, Farmington, UT
Dates: September 1, 1991–February 29, 1996

This project of the Davis County Private Industry Council is designed to improve science and mathematics instruction and learning through (1) involving 80 low-income, at-risk youth in personally meaningful mathematics and science experiences that help them overcome their basic skill deficiencies; (2) providing private sector employment opportunities for 80 mathematics and science school teachers; (3) increasing process skills of 54,000 students in the Davis School District; and (4) involving 250 mathematics and science teachers of grades K–9 in curriculum development and instructional material usage. Included in the project is participation by private sector scientists who are teaching technical topics in local schools, demonstrating real-world science applications to students and teachers, and providing information on career opportunities. Cost-sharing is 200 percent of the NSF award.



VERMONT

Vermont Rivers Teacher Enhancement Project

Award number:	9353347
Funding:	$706,623
PI:	Arthur C. Hessler
Co-PIs:	Daniel J. Bean, Nancy Keller, William Romond
Institution:	Saint Michael's College, Winooski, VT
Dates:	December 15, 1993–May 31, 1999

This project provides an intensive 3-week, in-service, residential summer institute for 90 Vermont middle level and ninth and tenth grade teachers. The content focus is on activity-based aquatic ecology as a vehicle for developing and teaching a model of integrative mathematics, science, and technology to teachers and students. For three summers, 30 different teachers each summer attend an institute at Saint Michael's College. Each teacher is required to restructure curricula in his or her school to include integrated aquatic ecology content for at least 3 years.

Schools are linked to one another and to the college campus by modem and Vermont Ed-Net telecomputing for data-sharing. Data are being collected from points along each river, interpreted, and subsequently analyzed. Collected data are being shared with local, state, and federal agencies. This project is aligned with the NSF-supported Vermont *Statewide Systemic Initiatives*, which is designed to teach integrative science, mathematics, and technology. Cost-sharing is 22 percent of the NSF award.

Growing Science Inquiry

Award number:	9254570
Funding:	$2,189,421
PI:	J.T. Parsons
Co-PI:	Eve Pranis
Institution:	National Gardening Association, Burlington, VT
Dates:	July 1, 1993–December 31, 1998

The National Gardening Association is providing professional development for elementary teachers interested in inquiry-centered teaching using plants in the classroom. The project provides 3-week summer workshops and follow-up support to leadership teams of teachers, school administrators, and community partners from 16 urban sites. These teams become experts in the use of two NSF-funded instructional programs, *GrowLab* and *Fast Plants*. Private businesses and informal learning centers, such as botanical gardens and horticultural clubs, provide content support to teachers. The teams of participating teachers offer professional development opportunities to other teachers in their region and act as advocates for inquiry-centered teaching in elementary classrooms. More than 360 teachers, administrators, and community partners are reached directly or indirectly by this leadership development project. A national network and newsletter disseminates news of this project. Cost-sharing represents 50 percent of the NSF award.

VIRGINIA

Encouraging High School Student Research in Biology Through Teacher–Scientist Partnerships

Award number:	9155206
Funding:	$516,786
PI:	Mary Bellamy
Institution:	National Association of Biology Teachers (NABT), Reston, VA
Dates:	September 1, 1992–February 28, 1998

This project is developing 12 field-tested, open-ended research projects that can be used by biology teachers as investigative science projects for first-year biology students. The research projects are developed by biology teachers working with laboratory scientists at the North Carolina Research Triangle Park and in the Washington, DC, area. Twelve teams of two teachers were paired with a scientist from a university or industry and worked in their laboratory for 3 weeks during the summer of 1993. Each team developed a simple, low-cost, open-ended research project that could be used in their classroom and gained hands-on experience with the procedures in the scientist's laboratory. They field-tested the experiment with their own students the following academic year and modified it as needed. A special education teacher worked with the NABT staff to modify the projects for students with special needs. After nationwide testing, the projects are being compiled into a monograph that is being made available to biology teachers nationwide. Project results are being disseminated through in-service workshops at national and state science teacher conventions and in local school districts. Cost-sharing equals 17 percent of the NSF award.

Virginia Historically Black Colleges and Universities (HBCU) Consortium for Science Education

Award number:	9153828
Funding:	$1,201,677
PI:	Carlton E. Brown
Co-PI:	Dianne B. Suber
Institution:	Hampton University, Hampton, VA
Dates:	August 1, 1991–July 31, 1995

This proposal provides a plan for establishing a consortium program of teacher enhancement and instructional improvement in science. The consortium involves three Historically Black Colleges and Universities in three regions of the Commonwealth of Virginia and establishes mechanisms for school system science education improvement. The institutions provide training in science content and pedagogy focused on minority student achievement, with the intent of increasing access to science careers for minority students. Instructional and project delivery mechanisms include Saturday courses, summer workshops, satellite and teleconferencing facilities, and electronic news networks. All courses are credited, if desired by participants, and structured to meet criteria for master's degree programs at Hampton University. Cost-sharing is equivalent to 21 percent of the NSF award.

IPSET: Integrated Physical Science for Elementary Teachers

Award number:	9155262
Funding:	$734,180
PI:	Preston Prather
Co-PI:	Stephen T. Thornton
Institution:	University of Virginia, Charlottesville, VA
Dates:	June 1, 1992–May 31, 1996

This leadership project is a cooperative effort of the University of Virginia and the Charlottesville City and Albemarle County School Systems. It prepares 20 three-member teams of lead teachers with a combination of integrated physical science content mastery, conceptual thinking skills, constructivist learning concepts, hands-on teaching methods, and leadership abilities. The project is conducted in two overlapping phases of 28 months each and provides the participating teachers with 270 contact hours (nine credit hours) in courses that integrate physical science, appropriate methods of science education, and strategies for effective leadership.

All of the 130 K–8 classroom teachers from the Charlottesville City schools and many from Albemarle County are reached through in-service training and support is provided by the lead teachers, the principals, and the project staff. The cost-sharing amount to be contributed by the University of Virginia is 27 percent of the NSF award.

Virginia Network for Technology (VANT) Outreach Program

Award number: 9253317
Funding: $536,682
PI: Marcia Tharp
Co-PI: E. Murray Rudisill
Institution: Old Dominion University Research Foundation, Norfolk, VA
Dates: March 1, 1993–August 31, 1996

The *VANT* project provides in-service training and supports activities of teacher trainers in Virginia and eastern North Carolina. In addition, the project is developing a network of 30 leadership teams, each composed of one mathematics and one science teacher to act as site coordinators for interactive telecourses that use *TRANSIT* (*Technology Reform and Specialists In-service Training*) materials developed at Ohio State University and NASA's Langley facility. Courses primarily focus on innovative methods of teaching mathematics and science and include significant amounts of appropriate technology for grades 6–12. Through a combination of video demonstrations and interactive dialog among teachers, the participants modify their own teaching to meet NCTM standards and respond to local concerns.

Each summer, 50 mathematics or science teachers from Virginia and North Carolina attend a 2-week leadership in-service. Twenty of the teachers are chosen to form two-person telecommunication site coordinator teams. These teams are chosen for their expertise and the availability of a satellite receiving station. Ten new teams are formed each year. The sites are connected to Old Dominion University and become telecourse and in-service training centers for additional teachers. All site coordinators receive two site visits from the *VANT* staff for support and are invited to participate in two academic-year, 1-day in-service workshops. In each of the subsequent 2 years, 50 additional teachers are directly trained and new centers are formed. The project directly trains 150 teachers; forms 20 telecommunication centers; and provides professional development opportunities for thousands of teachers.

Science Education and Quantitative Literacy (SEAQL)

Award number: 9355717
Funding: $1,444,305
PI: Jeffrey A. Witmer
Co-PIs: Art Christensen, Michael Kimel
Institution: American Statistical Association, Oberlin, VA
Dates: June 1, 1994–November 30, 1997

This project is enhancing middle and high school science teachers' performance in the classrooms and laboratories where standard sciences (biology, chemistry, physics, earth science, and general science) are taught. Instruction in the use of simple, yet powerful, statistical tools in the analysis of data and the use of technology is monitored and evaluated. Objectives are to upgrade science teachers' quantitative literacy knowledge and skills through instructional field-testing, the teacher institute, and follow-ups; instruct teachers in educational pedagogy, technology, and statistical and probabilistic quantitative literacy strands that enhance science lessons; field test and refine science lessons by means of several iterations; and disseminate information through workshops, professional organizations, and commercial publications. During the project, 255 science teachers throughout the United States participate in ongoing field-testing and refining of lessons. Four-week teacher institutes with follow-ups are planned. *SEAQL* builds on the American Statistical Association's Quantitative Literacy Project in mathematics. Cost-sharing is 4 percent of the NSF award.

WASHINGTON

Science is BASIC (Bridging Assessment into Science Instruction and Curriculum)

Award number:	9253208
Funding:	$435,368
PI:	Nancy Angello
Co-PI:	Judi Backman
Institution:	Highline School District, Seattle, WA
Dates:	July 1, 1993–December 31, 1996

The Highline School District has been a leader in the use of hands-on science kits in elementary schools. Virtually all teachers in all schools rely on a series of experiential learning modules for science instruction. The district now plans to replace its current system of paper-and-pencil student assessment with authentic assessment, which uses student performance products (for example, portfolios, discussion, simulations) as data for evaluation by teachers. Testing would change from a separate activity to one that is embedded in the instruction. Teachers are exposed to a variety of approaches to authentic assessment and supporting research materials. With the guidance of specialists on performance assessment, the teachers develop assessment techniques that fit into each kit module. Many simultaneous benefits accrue from this change: teachers gain greater insight into each student's abilities and needs, and the methods used for assessment become better aligned with the educational goals of the district. During the project, teachers work with volunteer scientists in developing assessment plans, thereby increasing their understanding of the true nature of scientific inquiry as well as of specific content areas. The implementation of performance assessment throughout the Highline District constitutes a unique and important experiment that has the potential for very wide impact. Cost-sharing represents 29 percent of the NSF award.

The Gorge, the River, the Valley, and the Ocean

Award number:	9155207
Funding:	$644,182
PI:	Dianne Barr-Cole
Co-PIs:	Howard L. Jones, Steven R. Brantley
Institution:	Educational Service District 112, Vancouver, WA
Dates:	August 15, 1992–January 31, 1996

This proposal is a cooperative effort between the Educational Service District and the U.S. Geological Survey to develop a science teacher education program that incorporates components of a successful NSF project that studied Mount St. Helens. The project provides instructional strategies to 120 teachers of grades 5–9 using a peer coaching and trainer-of-trainers model. Teams study the related physical and life sciences of the Columbia River Gorge, the Columbia River, the Willamette Valley, and the Pacific Ocean.

A Master's in Chemistry Program for Out-of-Field Teachers

Award number:	9050296
Funding:	$664,354
PI:	Glenn A. Crosby
Institution:	Washington State University, Pullman, WA
Dates:	January 1, 1991–December 31, 1995

This project is a comprehensive in-service program involving Washington State University, the State Office of Public Instruction, private foundations, government and private industrial laboratories, and local school districts. The project is targeted at 90 out-of-field teachers of high school chemistry and culminates in a master of arts degree in chemistry. Thirty teachers from the Northwest states of Washington, Oregon, Idaho, and Montana are selected each year to participate in a program that includes two 1-month periods of instruction on the university campus, four semesters of instruction via satellite during the academic years, and a 6-week assignment in an industrial laboratory coupled with on-site instruction. Satellite two-way video and audio telecommunications allow participants from long distances to benefit from on-site instruction. The instructional program includes offerings such as general chemistry from an advanced point of view, a two-semester organic and biochemistry sequence, and physical chemistry for the life sciences. Courses are not regular departmental offerings but are based on the expressed needs of participating teachers.

In the final summer, participants work in a Federal or industrial laboratory. This project provides a firm basis for the teaching of chemistry, including modern applications, an enhanced knowledge base of instructional strategies, and career information for future chemists. The NSF award supports the first group of 30 teachers; support for the 60 other teachers, as well as the institutionalization of the project, derives from other funds. Cost-sharing is 400 percent of the NSF award.

Restructuring Elementary School Science

Award number:	9155298
Funding:	$1,144,799
PI:	Robert E. Gibbs
Co-PI:	Scott Stowell
Institution:	Eastern Washington University, Cheney, WA
Dates:	June 15, 1992–November 30, 1997

This districtwide leadership project, a cooperative effort of Eastern Washington University and Spokane School District No. 81, provides extensive science education to K–6 school teachers in support of the district's plan to restructure the elementary school science curriculum dramatically. Each of the 36 district schools and 10 participating private elementary schools form a schoolwide implementation team that includes the principal, two lead teachers, and members of the school's instructional team. The 92 lead teachers participate in a 4-week summer institute, follow-up meetings during the academic year, and an additional 2-week institute during a subsequent summer.

In addition to serving as resource teachers and members of their school's implementation team, lead teachers assist project staff in developing and presenting short courses and workshops to support implementation of the science curriculum. To accommodate different levels of teacher interest and commitment, a number of different levels and types of short courses are provided for the district's 760 classroom teachers. Cost-sharing is 76 percent of the amount requested from NSF.

Washington Initiative in Science Education–Science Teacher Enhancement Project (WISE-STEP)

Award number: 9254491
Funding: $753,800
PI: Carole A. Kobota
Co-PI: John Smith
Institution: University of Washington, Seattle, WA
Dates: March 15, 1994–August 31, 1997

WISE-STEP is the pilot for a statewide, five-institute, multidistrict systemic project to align professional development experiences with emerging research both on teacher change and empowerment and on student learning. The project proposes to improve science education through the collaborative efforts of teachers, school and district administrators, scientists, community representatives, and university faculty. Through a series of summer institutes and academic-year follow-up activities *WISE-STEP* (1) directly assists 40 teachers in expanding their understanding and appreciation of science and their leadership abilities for school- and districtwide levels, (2) works with 20 schools in two school districts to develop the infrastructure needed to support quality science education in the elementary grades, (3) collaborates with institute participants and school officials on adopting high-quality science programs in their districts, and (4) collaborates with other scientists, teachers, and education faculty so that the institute model can be expanded to the entire state of Washington.

Operation Physics Outreach

Award number: 9355620
Funding: $986,254
PI: James E. Stewart
Institution: Western Washington University, Bellingham, WA
Dates: June 15, 1994–May 31, 1997

This project provides intensive training and academic-year support for a cadre of 40 lead elementary and middle school teachers from four districts in northwestern Washington State. With training in *Operation Physics* materials, leadership training, and continuing project and district support, these teachers provide comprehensive training and collegial support for essentially every other K–6 teacher in these districts. Lead (or level-two) teachers receive 50 days of training each year in summer workshops, academic-year workshops, and scientific research experiences; level-three teachers attend 2-week summer workshops. Unique features of the project are (1) university sciences, mathematics, English, and technology faculty provide summer instruction and academic-year consultation to the lead teachers; (2) lead teachers receive substantial release time; (3) an outside evaluator monitors the project; and (4) the entire project design has been driven by teachers to a great extent. Level-two teachers earn 36 graduate credits applicable to a master's degree in natural science; level-three teachers may earn three graduate credits for each summer.

Outreach Program for Junior High Science Teachers of American Indian and Native Alaskan Students in the Pacific Northwest

Award number: 9254463
Funding: $431,707
PI: Robert O. Watts
Co-PIs: Deborah L. Illman, Sara Selfe
Institution: University of Washington, Seattle, WA
Dates: June 15, 1993–November 30, 1996

The project develops culturally relevant, middle-school-level laboratory experiments that are tailored to the needs and interests of Pacific Northwest tribes. Twenty middle school teachers of Native Americans are trained in implementing these materials in the classroom in each of two summers at the University of Washington. A follow-up program of in-service workshops is held during the academic year. In addition, the teachers remain in contact with each other and the University of Washington faculty through an electronic network. The laboratory materials focus on tribal concerns, such as fisheries and forestry, soil analysis, museum conservation, and rediscovery of artistic techniques. The project uses tribal leaders and others who are experts in the traditions of the Native American tribes to ensure that the materials developed are appropriate for their cultures.

Teacher Institute for Science/Mathematics Education Through Engineering Experiences

Award number: 9254358
Funding: $648,241
PI: Richard L. Zollars
Co-PIs: William J. Thomson, Donald C. Orlich, James N. Petersen
Institution: Washington State University, Pullman, WA
Dates: August 1, 1993–January 31, 1997

This project brings 20 middle, secondary, and community college teachers to Washington State University for a little more than 6 weeks during each summer of the project. During this time, teachers are engaged in a research project of a mentor engineering faculty member. The aim of the project is to make teachers more aware of the nature of engineering and to incorporate some teaching modules into their classrooms based on their research experience. Visits by the mentor faculty to the participants' classroom during the year provide substantial follow-up of the research experience. In addition, the participants return to the university to present papers on their experiences with the teaching modules. The cost-share is 37 percent of the NSF award.

WEST VIRGINIA

Earth Science in West Virginia for the Twenty-First Century

Award number:	9155264
Funding:	$570,476
PI:	Hobart M. King
Co-PIs:	Phyllis Barnhart, Robert E. Behling
Institution:	West Virginia Geological & Economic Survey, Morgantown, WV
Dates:	August 1, 1992–July 31, 1996

This project responds to a state mandate that a third science course (earth and environmental science) be required in West Virginia. To assist secondary teachers with this new responsibility, a series of eight summer workshops in earth science were offered. Each 12-day workshop served 20 teachers. The workshops included a survey of earth science topics, expert lectures, laboratory exercises, field trips, and activities to improve teaching skills and encourage professional growth. Each teacher was provided a resource kit. Mentor teachers were trained to conduct workshops in their home areas. This project is a joint effort of the Department of Education and the West Virginia University Department of Geology and Geography.

WISCONSIN

Physical Science Institutes for K–3 Teachers

Award number: 9355481
Funding: $476,761
PI: Marilyn D. Duerst
Co-PI: David A. Pepi
Institution: University of Wisconsin–River Falls, River Falls, WI
Dates: May 1, 1994–April 30, 1998

"Hands-on, Minds-on, Hearts-on" is the theme of 3-week science institutes with extensive academic-year follow-up for primary (K–3) teachers. Three groups of 36 lead teachers are selected from 15 to 19 schools in rural school districts in east-central Minnesota and west-central Wisconsin. Each group is trained over a 2-year period. Initially, groups participate in a summer institute led by two University of Wisconsin–River Falls instructors who have extensive outreach experience. The teachers receive instruction in presenting hands-on activities and experience science learning and teaching from an inquiry and conceptual change perspective as they explore, field test, critique, and compare nationally recognized instructional materials. During the following academic year, these lead teachers field test selected modules in their own classrooms, with support from the project staff. A science curriculum lending library is established for use by participating districts. The second summer, the same group meets for a week to share experiences and plan in-service workshops, which they conduct for other K–3 teachers in their own schools. Since most of the targeted districts are in the transition state from traditional science teaching to hands-on instruction, the teacher participants play an important role in shaping science education in this region. The cost-sharing for the project is 23 percent of the NSF award.

Summer Institute Core, Outreach, and Multiplier Program for Genetics Education

Award number: 9153840
Funding: $1,238,994
PI: Raymond Kessel
Co-PIs: James H. Stewart, George T. O'Hearn
Institution: University of Wisconsin–Madison, Madison, WI
Dates: March 15, 1992–August 31, 1995

This project in genetics and biotechnology seeks to enhance and update teachers' background in genetics and the biotechnology of genetic engineering; provide effective curriculum and teaching strategies; facilitate transfer of content and process restructuring into the classroom; develop science education leadership in teachers; and develop strategies to make science education particularly relevant to rural populations and minorities. It includes a summer institute, held at the University of Wisconsin–Madison, and a series of local 1- or 2-week outreach workshops conducted by lead teachers. The target audience is secondary biology teachers, with strong emphasis on teachers from rural communities and those teaching minority students.

The summer institute, accommodating 120 teachers annually, offers a series of 1- and 2-week workshops that allow participants to choose their areas of interest. Ten lead teachers are recruited each year from the participants. They receive training to conduct 1- or 2-week local workshops and to serve as local resource teachers.

Logistical support for local outreach, anticipated to reach over 1,000 participants, is provided by a developing network of regional support centers based at University of Wisconsin campuses throughout the state. Cost-sharing by local outreach efforts is 43 percent of the NSF award.

In-Service Program in Biotechnology for Secondary Life Science and Agriculture Education Teachers

Award number: 9355652
Funding: $458,380
PI: Karen K. Klyczek
Co-PIs: Percy L. Neel, Michelle Wieghart, Douglas L. Johnson, Richard Jensen
Institution: University of Wisconsin–River Falls, River Falls, WI
Dates: July 1, 1994–June 30, 1997

This project provides an in-service program in biotechnology for both secondary life science and agriculture education teachers through a variety of workshop settings. The intent is to address the local, state, and national recommendations to increase the science content of agriculture and to create opportunities for agriculture education and life science teachers to work together. The project provides participants with new scientific knowledge related to biotechnology, specifically including the following: gene cloning, tissue culture, DNA analysis, and genetic modification of plants and animals; laboratory experiences that illustrate new techniques in biology; consumer information (for example, practical applications of biotechnology in agriculture and medicine); opportunities to share teaching experiences; successful demonstrations, teaching strategies, and laboratory experiences; and opportunities to discuss public concerns and ethical issues related to biotechnology. The project reaches a minimum of 300 teachers in Wisconsin, Minnesota, and South Dakota.

Project FIRST TWO Field Involvement: Research by Science Teachers Teams/Water/Ozone

Award number: 9355557
Funding: $743,745
PI: Gary Lake
Institution: Wisconsin Academy of Science, Arts, & Letters, Madison, WI
Dates: August 1, 1994–July 31, 1999

This project enables 100 teachers from Wisconsin to learn and be involved in scientific research. Teachers receive at least 5 days of staff development and are actively involved in up to 30 days of hands-on scientific research. The research is conducted individually under the mentorship of specifically selected scientists, within a team, or both. Team projects, which include an examination of water quality using biotic indexing and trails aimed at the effective use of milkweed as an indicator of ozone pollution, are conducted in collaboration with the Wisconsin Department of Natural Resources. The project's goals include: (1) improvement of the teaching of science by enabling selected teachers to become experienced in scientific research, (2) formation of partnerships with scientists for ongoing mentorship, (3) performance of valuable studies, and (4) the opportunity for selected teachers to assist in local research projects. The project is based on a successful NSF-funded project, *Field involvement: Research by Science Teachers (FIRST)*. This proposal benefits from the lessons learned from *FIRST*, the expertise it created among teachers, and the weaknesses that became apparent. The project also benefits from the experience gained (especially in terms of the leadership, pedagogy, and networking components) from *Earth Science Resource Associates (ESRA)*, an NSF-funded project of the Wisconsin Academy. Cost-sharing from participating institutions, agencies, and school districts is 23 percent of the NSF award.

Leadership Development: *Earth Science Resource Associates (ESRA)*

Award number: 9155198
Funding: $579,589
PI: LeRoy R. Lee
Co-PIs: Gene E. Musolf, Frank Zuerner
Institution: Wisconsin Academy of Sciences, Arts, & Letters, Madison, WI
Dates: April 15, 1992–September 30, 1995

This project is developing and maintaining a network of 60 middle or high school teachers and 40 agency and university geoscientists and university science educators. Project activities are delivered at multiple sites, e.g., a summer program at the University of Wisconsin–Madison campus, a conference at the Wisconsin Academy of Science, Arts, & Letters (Madison), a summer field trip to selected areas, and a retreat at the University of Wisconsin System Pigeon Lake field station.

Project objectives include (1) selecting exemplary middle or high school teachers with strong backgrounds in one or more of the earth sciences and university, agency, and business geoscientists with an interest in pre-college earth science education; (2) enhancing earth science knowledge of teacher participants through class and field experiences; (3) enhancing teacher participants' background in learning and teaching through class readings, discussions, and conference speakers; (4) developing a knowledge of existing programs and materials for teaching activity-based earth science; (5) conducting local, district, and state workshops and seminars for teachers by participants; and (6) developing an ongoing network. The project directly affects an estimated 1,500 students in the teachers' classes each year, an estimated 200 teachers at workshops scheduled each year, as well as a large number of teachers attending information-sharing presentations at state and area conferences.

Field Institutes for Elementary School Teachers

Award number: 9353350
Funding: $825,748
PI: LeRoy R. Lee
Co-PI: Meredith E. Ostrom
Institution: Wisconsin Academy of Sciences, Arts, & Letters, Madison, WI
Dates: November 1, 1993–April 30, 1998

This leadership project targets five geographically distributed districts in Wisconsin and is designed to (1) increase participant knowledge of Wisconsin geology and ecology, (2) increase the amount of field-based science used in the classroom, (3) develop participant understanding of the research base of teaching and learning as well as the application of that knowledge, (4) develop participant leadership skills and apply those skills in community and professional activities, and (5) develop a professional support network.

The project selects teams of two teachers per school, provides sessions for principals that engage them in field-based activities, actively works with the teachers in their schools to implement a field-based program, uses a materials resource center developed through a current NSF project for earth science teachers, and uses the experience of the *Wisconsin Elementary Science Teachers (WEST)* project to work with participants in developing quality workshops for other elementary teachers in the district and across the state. There are 27 days of scheduled activities, most in the field. Cost-sharing is 38 percent of the amount requested from NSF.

Empowering Teachers to Enhance Science Education

Award number: 9155386
Funding: $1,502,860
PI: John W. Moore
Co-PI: Glen E. Dirreen
Institution: University of Wisconsin–Madison, Madison, WI
Dates: June 1, 1992–November 30, 1995

This project, sponsored by the Institute for Chemical Education (ICE) at Madison, provides professional development opportunities for target audiences: (1) A 2-year, intensive content and pedagogy summer workshop program for 50 high school chemistry teachers of minority students in the Los Angeles area, as well as a strong academic-year follow-up is conducted on the campus of Mt. San Antonio College, Walnut, California. (2) A 2-year, intensive content and pedagogy summer workshop program for 40 nationally selected middle school teachers is held. The workshop includes laboratory and laboratory-safety techniques, work with computer applications, study of the connections chemistry makes with other fields, training in outreach activities, and work with middle school students in the University of Wisconsin–Madison *ChemCamp* program. (3) A 2-year, intensive summer program for 25 teachers focuses on use of chemistry instrumentation in the classroom. Included are 15 master teachers, selected from the participants in the earlier instrumentation program, who receive advanced training in instrumentation and instruction on how

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to give peer workshops in this subject. (4) A 1-year program for 20 elementary school teachers to enhance chemistry concepts and activities appropriate for that grade level. This project also trains college faculty and ICE affiliates, in how to carry out their own in-service program. The matching funds, contributed from the University of Wisconsin–Madison, constitute 13 percent of the NSF award.

Chemistry Fundamentals for Middle School Teachers; Maintaining the Institute for Chemical Education (ICE) Network

Award number:	9355562
Funding:	$723,481
PI:	John W. Moore
Institution:	University of Wisconsin–Madison, Madison, WI
Dates:	June 15, 1994–May 31, 1996

This project provides 40 teachers of grades 6–8 with training in a 4-week workshop each year. The training includes content lectures and demonstrations, laboratory work, chemical safety information, new ideas in pedagogy, practical teaching sessions with students in an associated science camp, relationship of chemistry to the other sciences and of chemistry and technology, outreach techniques, and group projects. It is anticipated that each participating teacher reaches an additional 35 teachers. Teachers who provide local training are eligible to apply to the Affiliate Incentive Award program which provides seed money for obtaining support from local sources to carry out ICE-like workshops at the local level. In addition, the project supports the ICE network of more than 2,500 teachers who receive a newsletter and are linked via the Internet with ICE field centers, affiliates, and participants. Cost-sharing equals 20 percent of the NSF award.

Earthkeeping: Restoration-Based Teacher Training Institutes

Award number:	9353445
Funding:	$497,983
PI:	Molly Murray
Institution:	University of Wisconsin–Madison, Madison, WI
Dates:	January 15, 1994–June 30, 1997

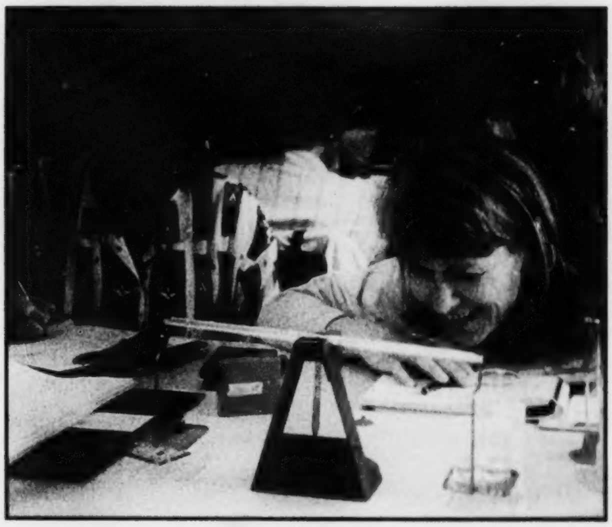
Teams of elementary and secondary school teachers participate in a series of *Earthkeeping* programs which use the process of ecological restoration to teach prairie ecology and natural and cultural history. The project is conducted at the University of Wisconsin–Madison Arboretum. Over a period of 2 years, two groups of teachers (96 teachers total) attend two 2-week workshops, meetings, conferences, and field days at the arboretum with school classes. In the initial 2-week summer workshop, 16 teachers (teams of two teachers each from eight schools) conduct hands-on ecological restoration activities—planning, site analysis and preparation, planting, and management. Teachers learn about the ecology and cultural and natural history of prairies as they reconstruct the biological community. They experience activities suitable for use in the classroom and are given the opportunity to develop curriculum plans. During the subsequent school year, teachers and their students begin to plan and plant prairies at their schools. The 16 teachers return to the arboretum the second summer with additional teachers from their respective schools (four associate teachers per school, on average). Each team of master teachers teaches their colleagues and works with these associates to develop curriculum plans and activities. The expanded teams of master and associate teachers offer in-service sessions on prairie ecology and prairie restoration for other teachers at their respective schools or districts.

Enhancement of Minority Student Achievement in the Science Classroom

Award number:	9155170
Funding:	$487,647
PI:	James H. Stewart
Co-PI:	John W. Anderson
Institution:	University of Wisconsin–Madison, Madison, WI
Dates:	September 1, 1992–August 31, 1995

This project is focused on improving minority student achievement in the science classroom. It continues activities begun by the Institute for Multicultural Science Education. Science teachers from the Madison and Milwaukee school districts meet in Madison with institute staff and faculty for 4 weeks during the summer to develop instruction in three areas that are predicted to enhance the science classroom environment for minority students. The institute is designed to foster changes in teachers' attitudes (toward minorities, role of teachers, organization of classroom) and empower the teachers to develop the skills necessary to put those attitudes into practice.

Teachers are focusing on two areas: (1) developing greater understanding of the strengths and needs of minority students; and (2) investigating the applicability of the cooperative-learning approach as well as the problem-solving approach to enriching multicultural science classrooms. Throughout the institute, teachers themselves learn in the cooperative-learning and problem-solving mode. Teachers are required to develop new instructional units for teaching their science classes the following year using these modes. Cost-sharing is equivalent to 52 percent of the NSF award.



Site-Specific Environmental Education

Award number: 9155194
Funding: $270,703
PI: James H. Stewart
Institution: University of Wisconsin–Madison, Madison, WI
Dates: August 15, 1992–January 31, 1996

Building on a successful pilot program in site-specific environmental education, teams of elementary and middle school teachers in this project participate in a 2-week field course in site-specific environmental education. Materials developed by the investigators for the Goose Lake Wildlife Area, Wisconsin, (the site for the project) include specific glacial, bedrock, and historical geology, limnology, botany, soil, and water information, as well as ecological generalizations and teaching activities suitable for the elementary and middle school classroom. The participants learn the natural and human history of the area, participate in fieldwork to reinforce instruction, and participate in and develop cross-curricular teaching activities.

During the second phase of the project, the participant teachers return to the University of Wisconsin–Madison campus to develop specific materials for a site of their choosing. After completing their own site-specific teacher's guide, the teachers use their new materials to provide in-service opportunities for other teachers in their districts. Desired outcomes are increased content knowledge in the environmental sciences, increased capability and enthusiasm for teaching environmental education, development of site-specific materials for local use by districts, and the dissemination of information and materials to other teachers in the participating districts.

Certification and Qualification Program for Underprepared Secondary Chemistry Teachers

Award number: 9155166
Funding: $896,357
PI: John A. Tonnis
Co-PIs: Roland R. Roskos, John P. Whitsett
Institution: University of Wisconsin–La Crosse, La Crosse, WI
Dates: May 1, 1992–October 31, 1996

This project provides a 4-year master's program specifically tailored for high school chemistry teachers in the state of Wisconsin. The program consists of a prerequisite year offering calculus and physics, followed by the major topics in chemistry (analytical chemistry, inorganic chemistry, organic chemistry, biochemistry, and physical chemistry) integrated with *STS* topics and safety issues. Pedagogical issues, as well as laboratory and demonstration techniques, are totally integrated into the program. In addition to the content and pedagogy, the project has a strong leadership component that involves key administrators from the schools where the teachers are employed. The matching funds from the university, the school districts, and business and industry constitute 22 percent of the NSF award.

In-Service Teacher Training in Environmental Education

Award number: 9253274
Funding: $1,212,770
PI: Richard J. Wilke
Co-PI: Daniel Sivek
Institution: University of Wisconsin–Stevens Point, Stevens Point, WI
Dates: November 1, 1992–April 30, 1996

This project trains K–12 educators in Wisconsin to incorporate environmental education into all areas of the curriculum. Twenty-five environmental educators offer 30 courses per year in locations throughout the state. This program also initiates a master's degree in environmental education at the University of Wisconsin–Stevens Point, which provides 50 teachers the opportunity to become leaders in environmental education. The cost-share is 15 percent of the NSF award.

Dissemination Through Wisconsin Fast Plants Master Leader Workshop

Award number: 9253355
Funding: $678,933
PI: Paul Williams
Institution: University of Wisconsin–Madison, Madison, WI
Dates: December 15, 1992–November 30, 1996

The *Wisconsin Fast Plants* project is disseminating an effective Teacher Enhancement program in biology to elementary and middle school teachers nationwide. Four different dissemination models involve the presentation of teacher workshops at universities and colleges, local schools districts, and other institutions, such as museums. Workshop leaders at these sites include scientists, master teachers, and science educators from museums and other institutions, as well as *Wisconsin Fast Plants* staff. All non-staff workshop leaders are trained by the *Wisconsin Fast Plants* staff.

The goals of the project are to (1) enhance teachers' attitudes toward science and their skills; (2) train teachers to grow and use *Fast Plants* for inquiry-based instruction; (3) bring *Fast Plants* and better science instruction to underserved students; (4) encourage community partnerships among educators, scientists, and institutions; (5) expand the *Fast Plants* network; and (6) continue to support all previous *Fast Plant* users. An estimated 3,000 teachers receive training from 126 workshops. An additional 6,000–9,000 teachers are expected to be reached by the project. Cost-sharing equals 21 percent of the NSF award.

Project X: Exchange of Information on Technical Careers

Award number:	9253248
Funding:	$381,060
PI:	Donald C. Woolston
Co-PIs:	Sharon Y. Hart, Bonnie H. Schmidt
Institution:	University of Wisconsin–Madison, Madison, WI
Dates:	September 1, 1992–August 31, 1995

This project provides training to teams of high school and middle school teachers and counselors about career issues in science, engineering, and technology. In the first year, 12 teams meet to learn about scientific and technical careers, develop communication and leadership skills, and prepare materials for in-service activities. In the second year, 18 additional teams join the project to participate in revision of the materials and to prepare for dissemination activities. In the third year, the final drafts of the materials are developed and the information about careers in science and technology is being disseminated throughout the state. The NSF award is matched by funds from the University of Wisconsin–Madison and collaborating institutions by an amount equivalent to 21 percent of the award.

WYOMING

Model Masters Degree Program

Award number:	9353338
Funding:	$1,550,332
PI:	A. Duane Porter
Institution:	University of Wyoming, Laramie, WY
Dates:	December 1, 1993–May 31, 1998

This master's degree program is designed for 50 well-prepared high school mathematics teachers, primarily from Wyoming and neighboring states. Participating teachers have a choice of two program formats: (1) an academic-year institute or (2) a sequential four-summer institute. The 14 specially designed courses of the program focus on mathematical content, pedagogical issues, integration of technology into the teaching of mathematics, and assessment. A program component focuses on the special needs of Native American students. A research paper, generally classroom-based, is required for the degree. After receiving their degrees, participants (with follow-up support from project staff) are expected to offer short courses in mathematics and pedagogy for other teachers in their home schools and districts.

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Key Words

NSF-Supported Instructional Materials

EDC-Insights is an elementary (grades K–6) comprehensive, hands-on, inquiry-based science curriculum developed by the Educational Development Center. The 24–36 activity-based modules target the needs of the urban school environment in the physical, life, and earth sciences.

Full Option Science System (FOSS) is a collection of developmentally sound prekindergarten through grade 6 (prek–6) multisensory, laboratory-based science activities developed by the University of California–Berkeley. Eight prek–2 modules and 16 grades 3–6 modules consist of teacher guides, equipment kits, student worksheets, and other materials.

Great Explorations in Mathematics and Science (GEMS) is an activity-based science curriculum for elementary and middle school students and was developed by the University of California–Berkeley. Thirty teachers' guides have been produced and disseminated nationally to replace or supplement existing curricula.

Interactive Mathematics Project (IMP) is a problem-based mathematics curriculum sponsored by San Francisco State University. Each unit features applications to physics, economics, art, sociology, and other disciplines. This curriculum replaces the existing 3-year high school sequence algebra I/geometry/algebra II.

PEACHES is a preschool through kindergarten ecological sciences curriculum developed by Lawrence Hall of Science at the University of California–Berkeley. A mathematics and science methods course, teacher science curriculum guide, and video were developed and disseminated to preschool educators.

Science and Technology for Children (STC) is an elementary (grades 1–6) hands-on, inquiry-based science curriculum produced through a collaboration between the National Academy of Sciences, National Science Resource Center, and Smithsonian Institution. Twenty-four units, which meet the needs of diverse cultures and ethnic backgrounds, are available to use alone or with an existing science curriculum.

Scope, Sequence, and Coordination (SS&C) is a national reform effort, coordinated by the National Science Teachers Association, in middle and secondary (grades 7–12) school science programs. SS&C spreads the teaching of science over 6 years and moves the emphasis from concrete to abstract.

NSF Initiatives

Statewide Systemic Initiatives (SSI) is a major effort initiated by NSF in 1991 to encourage improvements in science, mathematics, and engineering education through comprehensive systemic change in the state education systems. (Division of Educational System Reform)

Urban Systemic Initiatives (USI) is an effort initiated by NSF in 1993 to initiate reform that will accelerate the rate of change and implement improvement in student learning for grades K–12 in mathematics, science, and technology in 25 major urban settings. (Division of Educational System Reform)

National Organizations

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National Science Resource Center (NSRC)

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